

# Urban Waterways Newsletter

Urban Waterways and Education



Smithsonian  
*Anacostia Community Museum*

Issue #9  
Summer/Fall 2017

# Contents

<i>Introduction: Urban Waterways and Education</i> Katrina D. Lashley .....	3
<i>Bringing Nature Back to the City</i> Hyon K. Rah .....	5
<i>Earth Conservation Corps</i> Brenda Lee Richardson .....	10
<i>Louisville Waterfront Park: Fostering Community Awareness on the Importance of the Ohio River</i> Margaret Walker .....	12
<i>Education, Diversity, and Public Waters and Parks: Access for All!</i> Robert García and Nancy Negrete .....	15
<i>Pacific American Foundation</i> Herb Lee Jr. ....	21
<i>Urban Waterways</i> Derek Esibill .....	26
<i>Learning Science by Doing Science that Matters: Nā Wai ‘Ekolu and the Ala Wai Watershed Restoration Project</i> Kenneth Y. Kaneshiro, Yvonne L. Chan, and Megan Kawatachi .....	31
<i>The New York Harbor School</i> Katrina D. Lashley .....	36
<i>Anacostia Community Museum Community Garden</i> Katrina D. Lashley .....	47
<i>Creating Sustainable Gardens for Today’s Urban Gardeners: A Path to Return to Gardening.</i> Derek Thomas .....	48
Community Forums .....	55
Contributors .....	59

*The Smithsonian Anacostia Community Museum Urban Waterways Project is a long-term research and educational initiative based upon research on the Anacostia River and local communities, as well as research examining urban waterways in communities in other cities. The project raises public awareness about human-biosphere interaction, engenders appreciation for rivers and their role in sustainable urban development, and fosters civic responsibility and advocacy for waterways. It is particularly focused on working with communities on the frontline and most affected by development and environmental impacts.*



Smithsonian  
*Anacostia Community Museum*

1901 Fort Place SE  
Washington, DC 20020  
202.633.4820

**Newsletter Staff**

**Katrina Lashley, Editor**  
**Corianne Setzer, Designer**

**Front Image:**

The fish ladder at Ballard Locks in Seattle showcases the migratory fish that have always been vital to the Pacific Northwest's ecosystem: salmon and steelhead.

*Credit: U.S. Army Corps of Engineers.*



*Katrina D. Lashley is program coordinator of Urban Waterways at the Anacostia Community Museum. She received her BA in English literature and Italian at Rutgers University and MA in history (public history track) at American University with a focus on the British Caribbean.*

## **Introduction: Urban Waterways and Education**

Katrina D. Lashley

As waterways and their environs undergo the process of being restored and deemed valuable in the eyes of a variety of stakeholders, the multitude of their “values” has become apparent, as residents and other interested parties seek to define, solidify, and justify their connections and rights to these natural resources. How do we utilize them? What roles can the natural world play in our lives? This issue explores education along waterways. Education can be defined as “the process of giving or receiving systematic instruction, especially at a school or university.” It can also be defined as “an enlightening experience.” As communities look to a future in which equitable access to reclaimed natural resources is one of the foundational pieces to healthy, sustainable communities, what kind of educational experience is owed the people living along our urban waterways? Do either of the above definitions suit the task before us, or is it a combination of the two?

The contributors of this issue present a variety of models for how our natural resources can be used as an integral part of the transmission of skills and values needed to ensure informed civic engagement in the variety of issues facing communities, as they work to create a sense of belonging to and equal access to their natural world. **Hyon K. Rah**, of [RAH Solutions](#), explores how waterfronts can be used to instill the inter-relationship between urban vibrancy and the sustainability of the natural environment in people’s minds. **Brenda Richardson** charts the efforts of the [Earth Conservation Corps](#) to not only restore the Anacostia River but to also transform the lives of the youth who have worked to improve the health of their river and community. **Margaret Walker** highlights efforts on the part of the [Waterfront Development Corporation](#) to use Louisville’s award-winning waterfront park to educate residents on the importance of the Ohio River to the life of their city and how, through simple actions, they can play a role in preserving its health.

**The City Project’s Robert García** reinforces a primary theme of the Urban Waterways project, that the impacts of waterways extend far beyond their banks, through educational efforts to ensure Los Angeles residents are aware of their relationships to their city’s waterways and parks and how these natural resources are intimately tied to their concerns surrounding health, conservation, and justice. The work of educators on the island of O’ahu continues the exploration of a comprehensive approach to engaging communities, youth particularly, in multiple ways in which they are connected to and are responsible for the health of their natural world and the pathways available to them in their roles as civically engaged stewards of their larger communities.



*As communities look to a future in which equitable access to reclaimed natural resources is one of the foundational pieces to healthy, sustainable communities, what kind of educational experience is owed the people living along our urban waterways?*

**Herb Lee and Derek Esibill** of [the Pacific American Foundation](#) trace how their work serves to connect students to the historical and cultural importance of their natural resources and how such relationships have a practical application, creating a model for culture-based education, preservation, and stewardship in Hawai'i. The power of citizen science and the impact of youth participation are also highlighted by **Ken Kaneshiro, Yvonne Chan, and Megan Kawatachi** in their description of the Ala Wai Restoration Project which integrates traditional place-based knowledge with modern scientific technologies. The practical application of science through an enhancement of STEM education in the Ala Wai Watershed serves as a model of community empowerment and engagement, school collaboration, and the development of the next generation of community and environmental leaders.



*Hyon K. Rah works with communities around the world to prepare and implement infrastructure-based resilience strategies, drawing on her experience in architecture, urban planning, clean energy, and water management. She is principal of RAH Solutions which provides integrated solutions for sustainable development.*

## **Bringing Nature Back to the City**

Hyon K. Rah

I still remember my surprise watching chef Jamie Oliver quiz a group of schoolchildren on different types of fruits and vegetables. He held up a tomato and asked the children what it was, only to be met with confused looks and silence. The first child to hazard a guess said “potato.” When Oliver mentioned its relationship to ketchup, one said, “Oh, I know tomato ketchup,” easily recognizing the processed food.

Modernity and urbanization have afforded us many luxuries, such as the possibility of getting food on our table without having to deal with food production processes like farming or even cooking. At the same time, there are increasing public awareness and concerns about how we manage our natural resources, triggered by events such as the Flint water crisis, prolonged droughts in various parts of the country, and recurring flash floods. Many of these issues require long-term and participatory care by community members to mitigate and prevent. Unfortunately, the connection between these events and people’s daily lives is not obvious to many, and this makes it a challenge for people to care about and participate in improving their own environments. Why would anyone care about local fish conservation when the only times they face such fish is out of their natural habitat, most likely at supermarkets or on dinner plates? Why would anybody think twice about hacking down all the trees to build something more glamorous and profitable if the benefits the trees provide to air quality, food security, and the hydrological cycle are unknown to them? Why would someone advocate for preserving an urban stream when the alternative of cutting it off and building over it can provide additional income and business opportunities in the immediate future?

The starting point in addressing these questions might be recognizing the illogic of expecting someone to care about something that is not within his or her experience. Urban waterways can play an important role in instilling the interrelationship between urban vibrancy and the sustainability of natural environment in people’s minds. I’d like to offer a couple examples of how urban waterways can be put to such a use.



*The two locks in the complex offer visitors quite a spectacle, especially on sunny days when a lot of people are out in boats and kayaks.*

## **Ballard Locks, Seattle, USA**



Hiram M. Chittenden Locks, more famously known as the Ballard Locks, connects the tidal waters of Puget Sound to Salmon Bay, Lake Union, and Lake Washington. Credit: US Army Corps of Engineers.

The Hiram M. Chittenden Locks, also known as Ballard Locks, is a place residents of Seattle visit when they feel like getting a taste of being on a quick vacation without having to go too far. It is also a popular attraction among visitors to the city; overall, over one million people visit the locks each year. The two locks in the complex offer visitors quite a spectacle, especially on sunny days when a lot of people are out in boats and kayaks. The locks allow vessels to move between the Puget Sound and Lake Union by changing water levels to essentially serve as elevators for the boats. There are often cheerful interactions among the boaters, kayakers, and the visitors looking down from the elevated walkways.

In addition to the feel-good factor and the somewhat entrancing sights of boats moving up and down and then through the locks, Ballard Locks presents a multitude of educational lessons to its visitors in a way that feels organic and effortless. The elevated walkways take visitors through a route with views that make it easy to understand the role of the locks as an important gateway on the route from Puget Sound—and the ocean beyond—to Lake Union and a connected series of freshwater lakes. The locks, by providing an adjustable, intermediary zone, ensure that the water level of the lake is maintained at a range that won't affect the floating bridges, moorages, or boat clearances under bridges, regardless of the tidal behavior of the ocean side. They also prevent the salt water from the Puget Sound from mixing with the fresh water of the lakes. Even on a cursory visit, the relationship between the two major water bodies that encompass the city is made quite clear. The navigational and economic value the locks provide the city is illustrated by the frequent passages of both commercial and non-commercial vessels. For those curious to learn



*The experience of observing a group of fish climb the 21-step fish ladder through a series of large glass windows often piques visitors' curiosity to learn more about what is going on.*

more about the engineering and history behind all these, several signs are peppered around for viewing as well as a visitors' center.

Past the two locks, visitors cross the spillway dam, which controls the water level of the freshwater lakes, and make their way to the fish ladder viewing room. The experience of observing a group of fish climb the 21-step fish ladder through a series of large glass windows often piques visitors' curiosity to learn more about what is going on. The room contains helpful graphic signs, illustrating that the fish on view are sockeye salmon in June and July, chinook or coho salmon in September and October, and steelheads later in the year through the winter. The signs then transition to salmon conservation and watershed cleanup efforts in the area (starting with a graphical description of what a watershed is), partially motivated by the water quality requirements for the survival of the migratory fish population. Through this brief but experiential journey, Ballard Locks brings its visitors closer to the natural world. The combination of an engaging, memorable experience and a series of supplementary information delivers a message of conservation and stewardship that resonates in an approachable, non-preachy way.



Ballard Locks' fish ladder showcases the migratory fish that have always been vital to the Pacific Northwest's ecosystem: salmon and steelhead.

*Credit: U.S. Army Corps of Engineers.*

*Until its reintroduction to the public as an urban park in 2005, Cheong-gye-cheon was a sewage-ridden creek encased underground to make way for an elevated highway and a retail zone, part of a postwar economic development effort.*

### **Cheong-gye-cheon, Seoul, South Korea**



Cheong-gye-cheon before, during, and after the revitalization efforts. The linear urban park of today was once a foundation for an elevated freeway. *Credit: Ejay and her blog.*

Cheong-gye-cheon in Seoul, South Korea, is another example of an urban waterway that provides the city's residents and visitors with an experience tying urban ecology to the city's overall sustainability. A thriving urban park running 3.5 miles across the center of one of the densest cities in the world, Cheong-gye-cheon provides a way to connect to nature for an average 64,000 visitors each day.

Until its reintroduction to the public as an urban park in 2005, Cheong-gye-cheon was a sewage-ridden creek encased underground to make way for an elevated highway and a retail zone, part of a postwar economic development effort. In the 1990s, structural issues and associated safety concerns about the elevated highway led to a series of discussions about the area's future. As in many capital projects, the revitalization of Cheong-gye-cheon was not without controversy. That said, today, even the harshest critics would have a difficult time arguing against its role as an urban sanctuary where people retreat from their daily grind in the concrete jungle. Seoul is a very dense city—twice the population density of New York City—and that means most people live in condominiums and apartments with no outdoor spaces or gardens of their own. An accessible urban park featuring numerous plant and animals serves as an educational medium that keeps urban dwellers in tune with the ecological cycle in a way that was not possible before.

Located at a lower elevation than the surrounding built environment, Cheong-gye-cheon is designed to handle excess stormwater in cases of severe and/or prolonged rainfall up to a 200-year flood event. The changing water levels along the creek during rainy seasons serve as a visual marker for local precipitation patterns and raises awareness on ways



*Many of the park's benefits are obvious to its visitors, but its educational value has been magnified by the city's proactive work to publish data on the environmental and health benefits provided since 2005.*

stormwater can be managed in an urban setting. Cheon-gye-cheon is also a home to over 300 plant species, 25 fish species, 36 bird species, and almost 200 insect species, an over 600% increase in biodiversity compared to the area's elevated freeway days. In the fall, it's easy to spot children chasing after dragonflies around the creek, which was an unlikely sight in Seoul before the park came along.

Over a decade after its opening, Cheong-gye-cheon is an especially popular destination on hot summer evenings, as the temperatures around the creek during the summer months can be up to 36°F lower than just five to seven blocks away, according to a study by Seoul Metropolitan Government. The urban area around the creek previously harbored twice as many patients of respiratory diseases. Now, the area has 35% less small particle air pollution. An increase in wind speed of up to 7.8 percent through Cheon-gye-cheon's corridor helps further with mitigating air pollution.



Cheong-gye-cheon provides a calm urban refuge to Seoul's residents and visitors alike. Credit: Visit Seoul.Net.

Many of the park's benefits are obvious to its visitors, but its educational value has been magnified by the city's proactive work to publish data on the environmental and health benefits provided since 2005. These benefits include improved air quality and reduction in both traffic volume and heat island effect in the area. The number of fish and wildlife species in and around the park increased over six times after the reconstruction, from 98 to 626. This information was published on the Seoul Office of Planning website and in international journals and news articles. Seoul's communication of the post-reconstruction impact has helped to motivate several cities around the world—including Yonkers, New York, Los Angeles, and Singapore—to consider similar opportunities to include ecology features when developing or retrofitting urban infrastructure, especially along the water. Development has already taken place at the Yonkers site along the Saw Mill River, and the benefits include new local jobs, increased native vegetation, and the creation of a natural habitat and passage for migratory fish. While some issues—such as flood risk management and zoning—must be addressed to ensure the project's long-term success, as of today, careful planning, community engagement, and implementation have helped the project succeed in bringing nature back to the city.



*Brenda Lee Richardson, a resident of Ward 8 in Washington, D.C., and an eco-feminist, has been working on welfare reform, environmental justice, economic development, and health issues for the past 25 years. She currently serves as the interim managing director of the Earth Conservation Corps.*

### *Earth Conservation Corps*

Brenda Lee Richardson

*I believe I can fly ...* That song lyric is characteristic of the transformation that young people at the Earth Conservation Corps (ECC) make when they join the organization. Many of our urban youth in Washington, D.C., are indeed an endangered species. Many are lost to the violence in the streets with no alternatives to consider. The ECC takes on the task of saving their lives as they save their environment and their community.

The Earth Conservation Corps is a non-profit, youth development and environmental service organization located where the once heavily polluted Anacostia River flows through our nation's capital's most disadvantaged neighborhoods. Since 1989, the ECC has been successfully reclaiming two of America's most endangered resources—our youth and our environment. We use the challenge and promise of restoring the Anacostia River to engage unemployed community youth in transformative environmental action and service. A small but highly trained staff provides the young people with the leadership skills and environmental expertise to empower them to engage hundreds of school children and adults in the restoration of the Anacostia River.

Our history is inspiring. In 1992, nine unemployed young men and women living at Ward 8's Valley Green public housing project volunteered to engage in national service to change their lives by restoring the polluted Lower Beaverdam Creek. Motivated by the belief their strong hearts, minds, and muscles could reclaim the Anacostia, they pulled on waders, climbed into the polluted creek, and started to demolish negative stereotypes of African American urban youth and urban rivers. The astonishing commitment of these young volunteers launched a community youth movement to take back their Anacostia. Today, the river is much improved, but having 25 young adults laid to rest during that time is grim testament to the racial and economic divide in our nation's capital.

Following the leadership of Corps members, thousands of youth from vulnerable east of the river neighborhoods laid the cornerstone for a solution to the city's intertwined problems of pollution and poverty. In the process, Corps members desperate to contribute to American society have blazed new paths for themselves, their families, and their communities. Their success was in bringing to the impoverished communities of our nation's capital the proven esprit de corps of the Civilian Conservation Corps, the nation's largest national service effort in history that was created during the Great Depression. Engaging unemployed youth to undertake the vital work of restoring natural habitats



*Through restoration work and deployment of science, we strive to inspire and lead the restoration of the Anacostia River.*

harnesses the leadership, educational, and employment potential of this vital segment of our community.

Through restoration work and deployment of science, we strive to inspire and lead the restoration of the Anacostia River. We use our muscles, hearts, and minds to turn a once-forgotten river into a global model for the power of active conservation. We find strength from the words of Dr. Dianne Fossey: "It's not talking about conservation, it's the action that counts. Conservation begins with the boots on your feet." In 2017, we are blazing trails in water quality, wetland restoration, and tree canopy improvement. Our goals for each one are as follows:

- Water Quality Monitoring: To use this science as a tool to educate our youth and create a path for citizen scientists to invest in the river that flows through our nation's capital.
- Wetland Restoration: To protect and preserve Washington, D.C.'s only certified wetland on the banks of the Anacostia River. We use this as an opportunity to inform adults and children alike on the importance of the wetland and how it is a habitat for wildlife whose populations are growing stronger now that the river is much cleaner.
- Tree Canopy: To create a more beautiful and robust tree canopy east of the river which provides more shade to reduce electricity and clean our air. Trees also improve property value. Research has shown that trees bring a sense of calm to communities.

Corps members have inspired the Restoration of the Anacostia River initiative and continue their leadership of ecosystem restoration. Corps members have always done this by tackling the impossible and getting it done. Today, having turned a city's focus to the Anacostia River, our youth are continuing to deploy innovative science and fully restore this once-forgotten river to its full function as an environmental system with its entire native species. Today, the condition of the Anacostia River has taken a dramatic turn. The presence of a growing population of eagles in our nation's capital is a good sign of the river's improved health. More turtles are basking in the sun on the river. Our youth are continuing to deploy innovative science in keeping their eye on the prize to continue to restore the river so that it is one day a swimmable and fishable thriving environmental system.

Margaret Walker is an information officer with the Waterfront Development Corporation. Established in 1986, the Waterfront Development Corporation plans, coordinates, and implements strategies to revitalize Louisville's waterfront.

## *Louisville Waterfront Park: Fostering Community Awareness on the Importance of the Ohio River*

Margaret Walker

The history of Louisville, Kentucky, is forever intertwined with the mighty Ohio River, which borders approximately 25 miles of the city along its path from the Allegheny and Monongahela Rivers in Pittsburgh to where it flows into the Mississippi River in Cairo, Illinois. Louisville was founded because of its location on the Ohio, and since the city's inception it has depended on the river for both commerce and sustenance.

From the early flatboats and steamboats that docked at the bustling city wharf to modern commercial barge and overnight river cruise traffic, the Ohio continues to serve as a vital economic engine for the community. To this day, the Ohio River is one of the most heavily traveled U.S. inland waterways for commercial transport. Passenger cruise vessels such as the *American Queen* and *Queen of the Mississippi* have become more popular than ever, frequently stopping in Louisville overnight and sending tour busses full of cruise passengers to local attractions throughout the community.



The Living Lands & Waters operation includes the solar powered House Barge with a kitchen, office space, dorm rooms, and a classroom; the Garbage Barge from which the majority of what is collected is recycled; the Crane Barge with a 3,000 pound boom crane; and the CORPS Barge that carries tires and scrap metal.

*Credit: Waterfront Development Corporation.*

At the same time, the Ohio River provides an endless supply of water to residents throughout the region through the Louisville Water Company, which began operations in 1860. LWC is recognized nationwide for the quality of the drinking water it provides, and in fact is one of only two water utilities in the United States to be twice awarded the Partnership for Safe Water's "Excellence in Water Treatment Award." This puts Louisville Water among the top 0.5 percent of water systems in the country.

The 85-acre Louisville Waterfront Park is located along the river in downtown Louisville, where, historically, Beargrass Creek entered the river and where major industry operated from the mid-1800s through the early



*Waterfront Park encourages good stewardship of our natural resources—85 acres of parkland and the river itself.*

1980s. An area aptly named Butchertown was home to huge commercial slaughter houses and pork-packing firms that basically used Beargrass Creek as an open sewer, dumping effluvial waste directly into the creek that was carried into the Ohio River next to where grand showboats, luxury packet boats, and steamboats were docked. The polluted water, described in newspaper articles of the day as “a dark crimson color,” was a huge problem for the city until the creek was re-routed to the east of the city center in the 1850s.

From those original stockyards that daily turned the water red to the scrapyards, sand and gravel, and heavy industry that inhabited the riverfront into the early 1990s, pollution of the Ohio River has been a persistent problem. The passage of the Clean Water Act in 1972 provided some relief, however, and according to Judy Petersen, the former executive director of and current consultant to the Kentucky Waterways Alliance, “the Ohio River is cleaner than it has been in many, many decades. People cleaning up all the sewer overflows and the Clean Water Act that put limits on many of [the] kinds of industrial facilities that discharge into the Ohio—all of those have had an enormous impact.”<sup>1</sup>

Waterfront Park encourages good stewardship of our natural resources—85 acres of parkland and the river itself. We require producers of special events to recycle and furnish recycling boxes to be used alongside waste receptacles. A number of years ago, Waterfront Park began partnering with the Louisville Water Company to provide fresh water drinking stations at large events where people can either bring their own reusable water bottle or purchase one on site that can be filled and refilled with Louisville tap water for free. This program, *Louisville pure tap® to GO*, began as a collaboration between park staff and LWC and has since been extended throughout the community for use at both public and private events.



*Louisville pure tap® to GO helps lessen the flow of plastic water bottles into landfills by setting up water stations at special events where people can fill and refill their reusable water bottles. Credit: Waterfront Development Corporation.*



*Clean Vibes provides volunteers to help festival-goers separate refuse into bins for compost, landfill, and recycling. Credit: Waterfront Development Corporation.*

1. [www.alleghenyfront.org/what-you-need-to-know-about-legacy-pollution-in-the-ohio-river/](http://www.alleghenyfront.org/what-you-need-to-know-about-legacy-pollution-in-the-ohio-river/)



*"Over a weekend of 60,000 plus attendees for a major music festival, Clean Vibes trains the general public to sort and dispose of landfill waste, compost, and recycling."*

*– Ashley Smith,  
Waterfront Park  
Events Director*

One of the biggest events hosted in Waterfront Park every year is the Forecastle Festival, a nationally acclaimed festival that focuses on music and the environment. Forecastle features concerts by national acts while also promoting environmental education and advocacy. Past musical guests have included Jack White, The Black Keys, Outkast, Widespread Panic, Beck, Sam Smith, Smashing Pumpkins, My Morning Jacket, Bassnectar, The Flaming Lips, and The Avett Brothers, alongside nationally recognized speakers and organizations including Robert F. Kennedy Jr. (Riverkeepers), Rob Caughlan (Surfrider Foundation) and Christopher Childs (Greenpeace International).

Forecastle walks the walk. To ensure that the festival's carbon footprint is neutral, they partner with national Clean Energy provider Arcadia Power. For every kWh of electricity used at the festival, a kWh is produced and put on the grid by a pollution-free, renewable source, like wind and solar.

Forecastle has also optimized its recycling efforts by teaming with an organization called *Clean Vibes*, which utilizes volunteers to blanket large events to make sure festival-goers are aware of and make use of recycling accommodations. According to Waterfront Park Events Director Ashley Smith, "Clean Vibes answers a real need for major events producers and has set the bar for the best practice in waste diversion at events in Kentucky. Over a weekend of 60,000 plus attendees for a major music festival, Clean Vibes trains the general public to sort and dispose of landfill waste, compost, and recycling. The amount of recycling and compost that they are able to divert from the landfill is staggering. This is not only best practice for the industry, it is a meaningful educational experience for those that attend."



*Clean Vibes volunteers on the Louisville Wharf. Credit: Waterfront Development Corporation.*

One last example of environmental activism at Louisville's waterfront is provided by the organization Living Lands & Waters, which has visited Waterfront Park a number of times through the years, most recently in November 2016. They usually visit for a week at a time, hosting community-based river cleanups, educational workshops in their floating classroom, and tours of their one-of-a-kind "industrial strength" barge operation.

LL&W workshops are popular field trips for local high school students, using hands-on activities to make students aware of the importance of environmental issues related to river health, including the value of clean water, waste reduction, and recycling.

Waterfront Park will continue to search out opportunities to help educate the community about the significance of the Ohio River to our daily lives and its crucial role in the very existence of our city. After all, if it weren't for the river, we wouldn't be here.



*Robert García is director-counsel of The City Project.*

*Nancy Negrete, a former program manager at The City Project, is now in a Master's program in divinity school.*

## ***Education, Diversity, and Public Waters and Parks: Access for All!***

Robert García and Nancy Negrete

### **Overview**

Education takes place in many ways along the Los Angeles River and other public waters and parks. Students of all ages learn how to improve their lives, communities, and natural world by advocating for people, places, and values. Education can help overcome barriers in access to green space, especially for people of color and low income people. How? Education can help people feel rivers, parks, school fields, and museums belong to them, and that they belong there. This is true along the L.A. River, Ballona Creek, the San Gabriel River, the Santa Monica and San Gabriel mountains, beaches, and school fields. Education programs tell the story of how the green justice movement is diversifying democracy from the ground up, while fighting against green displacement and gentrification. The current pushback by the people against shrinking or eliminating national monuments shows this holds true for public waters, parks, recreation areas, monuments, and schools across the nation.

Education about people, places, and values works. These values include fun, health, human development, housing, climate justice, conservation, culture, history, art, jobs, equal justice, and democracy. The message is this: Visit a park, river, museum, or school. Have fun. Be healthy. Learn. Get a job as an environmental justice steward. Save the earth and her people.

The City Project is developing education programs with diverse allies through the new Healthy Living in the Parklands Initiative. Allies include Baldwin Hills Conservancy, Charles Drew University (CDU) of Medicine and Science, L.A. County Department of Health, L.A. County Department of Parks and Recreation, NEEF (the National Environmental Education Foundation, chartered by Congress), Smithsonian Anacostia Community Museum, and others. Education programs drawing on broader research are tailored to engage and benefit local communities directly. CDU is the only historically black-serving university west of the Mississippi and the only one in the nation serving blacks and Latinos.

### **Conservation**

Urban waters and parks in L.A. offer opportunities for education about conservation. These include clean water, air, and land, flood control, habitat protection, climate justice, and green space in parks and schools. Conservation matters to all communities.

### **People**

People matter. The range of values needs to be part of any education programs.



*There are not enough parks for children to play, especially children of color. This is an issue of social justice.*

For example, sports and physical activity connect fun, healthy living, and culture. Raul Macías and Anahuak Youth Sports Association use soccer as an organizing tool. In L.A., culture, history, and art are central. Native American villages were located along the L.A. River. The first Spanish explorers and missionaries camped along the river. The Pobladores who founded El Pueblo de Los Angeles on the banks of the river included people from what became Mexico, Afro-Latinos, and Native Americans. Yankees arrived with the Gold Rush and the U.S. war against Mexico in the 1840s. Chinese, Japanese, Italians, and French settled in what is sometimes thought of as the Ellis Island of Los Angeles. L.A. State Historic Park is now nearby, along with Río de Los Angeles State Park and Sonia Sotomayor Learning Academy. The Academy, a complex of public high schools and playing fields along the river, is named after the first Hispanic U.S. Supreme Court Justice and includes the L.A. River School.

Baldwin Hills Park, in the historic heart of African American L.A., is the largest urban park designed in the U.S. in over a century. Ancient Native American sites lie in the hills and along Ballona Creek. The history of the area as a Spanish rancho is reflected in the “Dons” neighborhood, where streets are named after Spanish dons. African Americans first moved west from South Central L.A. into the Baldwin Hills after the U.S. Supreme Court struck down housing restrictions in the 1950s. This resulted in massive white flight. Oil fields, active since the 1920s, deterred development and left open space in the hills, even as fossil fuels impact health, climate, pollution, and congestion in what is now the most heavily regulated urban oil field in the nation. The Baldwin Hills Dam broke in 1963, driving home the risks of mixing oil drilling, water, and earthquakes. Ballona Creek flows 13 miles from the hills west to the ocean. Parks, schools, and the Mar Vista Gardens public housing project line Ballona Creek. Interpretive signs along the creek teach about the environment but are silent about people and culture.

President Barack Obama listened to the community when he dedicated the San Gabriel Mountains National Monument in 2014. There are not enough parks for children to play, especially children of color. This is an issue of social justice. Access means access for all, young and old, black and white, Latinos, Native Americans, and Asian Americans, according to the president. The current administration now seeks to review, shrink, or eliminate monuments like the San Gabriels in ways that undermine diverse values, the rule of law, and democratic governance by we the people.<sup>1</sup>

---

1. The City Project, Next 100, GreenLatinos, International Maya League, and Robert Bracamontes, Public Comments re: Maintain National Monuments (July 10, 2017). Available at [www.cityprojectca.org/blog/archives/44682](http://www.cityprojectca.org/blog/archives/44682).



*The Los Angeles Unified School District used eminent domain against a wealthy developer to buy the land for Sonia Sotomayor Learning Academy, and successfully sued the City of L.A. to clean up the contaminated property.*

### **Health**

There are not enough parks for children to play in L.A., especially for children of color and low-income children. This contributes to related health inequities. Public agencies and recipients of taxpayers' dollars need to alleviate these inequities to promote equal justice, health equity, and environmental justice, according to studies by the National Park Service and U.S. Army Corps of Engineers. NEEF offers "Rx for Outdoor Activity" education programs for health care providers to get people active in parks and schools.

### **Green Justice**

Education programs tell the story of epic community victories for public waters, parks, and schools. The Chinatown Yard Alliance persuaded the state to create L.A. State Historic Park, and stopped the city of L.A. and a wealthy developer from building warehouses with federal funding. The Coalition for a State Park at Taylor Yard fought to give kids a place to play, and stopped a developer from building a big box project there. These victories kicked off the revitalization of the L.A. River. The Los Angeles Unified School District used eminent domain against a wealthy developer to buy land for Sonia Sotomayor Learning Academy, and successfully sued the city of L.A. to clean up the contaminated property. Anahuak, The City Project, and others worked together on the first-ever multicultural, bilingual NEEF National Public Lands Day events at Rio de Los Angeles State Park in 2016 and 2017. These are best practices for "day in the park"



National Public Lands Day is the nation's largest, single-day volunteer effort for public lands. These photos were taken at Río de Los Angeles State Park. Photo credit: *Amando Ruiz, NEEF.*





*As demographics change, transformational change is needed so the people who visit and work in parks look like the new face of California and the nation.*

African American activists and homeowners working with civil rights attorneys and mainstream environmentalists stopped a power plant and garbage dump at the Baldwin Hills Park. They limited oil drilling through a successful suit against the county and oil company. With the US Environmental Protection Agency and others, they won a \$2 billion lawsuit to eliminate noxious odors, clean up the sewer system citywide, and create park and water projects, including Civil Rights Park and South L.A. Wetlands Park.

Transit to park programs like the local Transit to Trails take inner city children on fun, healthy, educational trips to parks, rivers, beaches, mountains, and deserts. The federal Every Kid in a Park is partnering with the Los Angeles school district to provide trips and education materials for 19,000 fourth graders this year.

The San Gabriel Mountains Forever campaign organized support for the national monument; its Academy educates students on environmental quality, social justice, and health equity, and supports Transit to Trails programs.

### **Diversity and Inclusion**

Public parks and waters are essential to the well-being of the earth and her people. People of color and low-income people disproportionately lack access to public parks and waters. As demographics change, transformational change is needed so the people who visit and work in parks look like the new face of California and the nation. California's Latino population, for example, is projected to grow from 38% in 2010 to 45% in 2040. Millennials born between 1980 and 2000 constituted 29% of the state's population in 2010, and represent the single largest generation in human history. People increasingly live in cities. In 2010, 61% of Californians were clustered in three urban areas; by 2050, that number is projected to grow to 76%. Latinos are more heavily represented among younger people. Among millennials, 46% were Latinos in 2010, while 51% of 12 year olds were Latinos.<sup>2</sup>

Best practices combine education and planning to give people a personal sense of belonging to a place. According to a Stanford University study, ethnic studies programs increase attendance, classes taken, and grade point averages in schools across all subjects, including STEM subjects. The study is the first to quantify the impact of ethnic studies on educational outcomes.<sup>3</sup> The study demonstrates the causal effects of personal relevance in education. People will do more and learn more if they feel

2. Robert García and Ariel Collins, *Parks Forward for All*, NRPA Parks & Recreation Magazine (March 1, 2015). Available at [www.cityprojectca.org/blog/archives/36007](http://www.cityprojectca.org/blog/archives/36007).

3. Thomas Dee, Emily Penner, *The Causal Effects of Cultural Relevance: Evidence from an Ethnic Studies Curriculum*, Working Paper (2016). Available at [www.nber.org/papers/w21865](http://www.nber.org/papers/w21865).



*As neighborhoods become greener, more desirable, and more expensive, people who have fought epic battles to improve their quality of life can no longer afford to live or even work nearby.*

the experience is directly relevant to their lives and culture. Similar reasoning applies to education in parks, schools, and museums, institutions best suited to teach students and their elders. Engaging younger generations in personal ways can foster lifelong commitments to healthy active living, conservation, culture, justice, and democracy. The outcome can be greater diversity and inclusion in visitors and the work force, more people in parks, schools, and museums, and greater support for public parks, waters, museums, and schools.

The Anacostia Community Museum's Urban Waterways Project is a best practice for addressing urban waters, civic engagement, and equitable development.

### **Overcoming Barriers to Access**

Education programs can help overcome barriers to access.

- People of color and low-income people lack parks and recreation where they live and work.
- People of color and low-income voters are among the most concerned about environmental issues, are willing to pay more for environmental protections, and are among the strongest voters for water, park, and resource measures.
- Park staffs and visitors lack diversity. Many people feel unwelcome and are concerned about discrimination.
- Staff and programs need to demonstrate multicultural fluency. Staff training helps. Bilingual staff and signs are not enough.
- Active recreation in local parks and schools is needed. "Taking kids to nature" in faraway places is good but not enough.
- Education about conservation is important but not enough. Education cannot focus only on parts per million of pollution in the water, air, and land; the hydrology or geology of a river or park; or even the incidence of asthma rates and other health vulnerabilities.
- Cost barriers hamper access, including entrance fees, parking, transportation, clothing, equipment, and time away from work.
- Transit to Trails programs provide education and opportunities for getting to and from parks, schools, and museums and what to do there.<sup>4</sup>
- Youth jobs and contracts for diverse enterprises are needed to build a well-trained staff, provide training and promotion, and broaden the constituency for waters, parks, and museums.

As neighborhoods become greener, more desirable, and more expensive, people who fought epic battles to improve their quality of life can no longer afford to live or even work nearby. Civil rights, environmental justice, and health equity strategies by and for the people offer hope.

4. See The City Project, Literature Review: *Overcoming Barriers to Park Access* (forthcoming 2017).

People have the right to hold public officials and recipients accountable for the fair use of taxpayers' dollars. Government agencies and recipients need to distribute benefits and burdens of public waters and parks fairly for all.

That's how people from Anahuak, Concerned Citizens of South Central Los Angeles, Chinatown, the San Gabriel Valley, and others won community victories.

### Education and Planning

The Presidential Memorandum on diversity and inclusion in public parks and waters, recreation areas, and monuments offers lessons directly relevant here.<sup>5</sup> Waters and parks need to provide opportunities for everyone to enjoy safe and healthy recreation, housing, education, jobs, and climate. People have the right to hold public officials and recipients accountable for the fair use of taxpayers' dollars. Government agencies and recipients need to distribute benefits and burdens of public resources fairly for all. Agencies need to diversify who works in, visits, and benefits from parks and museums. Action plans need to be implemented to accomplish these goals. Standards, data, and plans defined in advance are necessary to measure progress, provide for mid-course correction, and hold officials and recipients accountable.<sup>6</sup> We must watch how programs play out on the ground to guard against discrimination however subtle, prevent green displacement, and ensure equal opportunities for all.<sup>7</sup>

The National Academies of Sciences, Engineering, and Medicine committee report called *Communities in Action: Pathways to Health Equity* recognizes parks and recreation are important determinants of health. The report recommends agencies, funders, and stakeholders implement civil rights strategies to promote health equity.<sup>8</sup> We agree.

The Gateways/Portales mural is a best practice of a museum education program about people, places, and values. The mural was created by Rosalia Torres-Weiner, of Charlotte, NC, in 2016 specifically for the exhibition of the same name at the Smithsonian Anacostia Community Museum. Credit: Susana Raab.



5. Presidential Memorandum, *Promoting Diversity and Inclusion in Our National Parks, National Forests, and Other Public Lands and Waters* (2017), [next100coalition.org/obama-memo](http://next100coalition.org/obama-memo).

6. Robert García, Ariel Collins, Cesar De La Vega, *Park Funding for All! Park, environmental, and other public funds should benefit all people equitably and without discrimination* (The City Project Policy Report 2016), [www.cityprojectca.org/blog/wp-content/uploads/2016/09/Policy-Brief-Park-Funding-for-All-20160908.pdf](http://www.cityprojectca.org/blog/wp-content/uploads/2016/09/Policy-Brief-Park-Funding-for-All-20160908.pdf).

7. Robert García and Tim Mok, *Whitewashing the Los Angeles River? Displacement and Equitable Greening*, The City Project Policy Report 2017. Available at [www.cityprojectca.org/blog/archives/44644](http://www.cityprojectca.org/blog/archives/44644).

8. National Academies of Sciences, Engineering, and Medicine committee report, *Communities in Action: Pathways to Health Equity* (2017). See pages S-12, S-14, 1-9, 3-35 to -38, 3-3 to 3-48, 6-7 to -9, 5-72 to -78, 6-13 to -22 (civil rights strategies and equity framework to avoid displacement), 7-2 to -5, 8-15 to -18, Recommendations 3-1, 6-1 and 7.1, and authorities cited. Available at [www.nationalacademies.org/promotehealthequity](http://www.nationalacademies.org/promotehealthequity).



Herb Lee Jr. serves as executive director at the Pacific American Foundation . He has been a member of the advisory board of AKAMAI Capital LLC since September 2012.

## *Pacific American Foundation*

Herb Lee Jr.

*“When we cease to understand our connection to land, when we no longer accept responsibility for our actions to the land and sea, when we abdicate being accountable for our own learning, when we no longer strive to become stewards, when we fail to appreciate history and the importance of culture, we destroy the light of hope within ourselves and the journey of generations toward global sustainability.”—Herb Lee Jr.*

In the days of old, Hawai'i was the most isolated land mass on the planet, nearly 2,500 miles from any major continent. Native Hawai'ians occupied the islands of Hawai'i for nearly 1,500 years and developed some of the most sophisticated land-management systems to sustain an abundant and growing population.

Hawai'ian loko l'a (fishponds) were constructed approximately 800 years ago and marked a historic turning point from catching fish (as hunter/gatherers) in the open sea to actually “farming” fish within these marvelously constructed ancient fishponds.

Since that time, multiple types of ponds have been constructed, some were close to the sea or bays and some built upstream of major waterways that flowed from the “mountain to the sea.”

My specific experience and story I want to share is one entitled “Kāhea o Waikalua Loko l'a,” the call of the Waikalua Fishpond. The Hawai'ian word Waikalua refers to the two waters or the two pits. “Wai” refers to fresh water. These ancient ponds ranged in size from 900 acres to one acre or less and have been found on all of the major Hawai'ian Islands in some form.

Researchers have documented that 488 of these ponds were constructed over a period of 800 years. Today, approximately 10% to 15% remain. In the 21st century, these remarkable feats of Hawai'ian engineering are on the verge of vanishing.

In 1995, I started a non-profit organization called the Waikalua Loko Fishpond Preservation Society to restore, revitalize, preserve, and cultivate the knowledge of the “loko l'a.” Although I grew up less than a mile away from this magnificent Hawai'ian cultural resource, I did not “discover” it until I was 40 years old. Most people in 1995 had forgotten the history and connection these special places (wahi pana) of human cultivation and food production commanded in the rich heritage of Hawai'i. Why? In less than 150 years, Hawai'i has gone from being almost totally self-sustainable to being 90% dependent on ships to bring us food!



*In 2000, the Waikalua Loko Fishpond Preservation Society partnered with the Pacific American Foundation to embark on a journey that would begin to re-set the paradigm of how we educate our children in Hawai'i.*

Waikalua Loko l'a is a 12-acre pond located in the southern part of Kāne'ōhe Bay on the island of O'ahu. She was built 400 years ago between two fresh water streams, one of which used to flow into the back of the pond. Diversion of Kawa stream around the pond was said to have occurred to improve flood control of a growing urbanized area surrounding the pond in the early 1960s.

Kāne'ōhe Bay is the largest sheltered body of water or embayment in the Hawai'ian Islands. It is situated on the Ko'olau or windward side of the island where it rains almost every day and has an abundance of fresh water.

In the fall of 1998, a local science teacher from a nearby high school found out we were restoring the fishpond and asked if she could bring students who were having a hard time learning science in the classroom. Over the next nine months, we experienced the most amazing transformation in these students! They not only became inspired learners of science but they grew to understand the relevance of what they were learning and were able to make a meaningful contribution to the restoration and preservation of the pond!

As a consequence, we asked ourselves three questions: (1) Can we duplicate this; (2) Can we reach more students with this type of "hands-on" learning; and (3) What if we were able to start teaching students from kindergarten? Needless to say, I was excited while selfishly thinking we could also recruit more people to help restore the pond that for all intents and purposes had deteriorated nearly beyond recognition.

In 2000, the Waikalua Loko Fishpond Preservation Society partnered with the Pacific American Foundation (PAF) to embark on a journey that would begin to re-set the paradigm of how we educate our children in Hawai'i. PAF is a non-profit 501(c)3 organization incorporated in 1993. Its mission is to "improve the lives of all Pacific Americans." (Pacific Americans are defined as encompassing citizens of the United States who can trace their ancestry to the indigenous settlers of the state of Hawai'i, territory of American Samoa, territory of Guam, and Commonwealth of the Northern Marianas Islands, Fiji, New Zealand, Tahiti, and Tonga.) In 2005, I was appointed to lead PAF as its new executive director, a position I continue to hold.

PAF has also been proactive in developing partnerships so students would have a "community classroom" experience outside of the traditional school campus to learn, apply knowledge, and help solve real-world problems in their own communities. To date PAF has developed (1) over 200 partners



*PAF has prided itself in creating and building upon small successes that have firm foundations.*

throughout the state of Hawai'i, the Pacific, and the U.S. continent to help support its success and mission; (2) enrolled over 21,000 students in its career planning system; (3) trained over 4,500 teachers statewide; (4) hosted 100,000 students, parents, teachers, and community members since 1995 to learn and steward the Waikalua fishpond; and (5) assisted in forming a statewide organization called Hui Malama o Loko l'a that created a network to share knowledge about these rich cultural resources.

PAF has prided itself in creating and building upon small successes that have firm foundations. These foundations in education, earning the trust and respect of the community, have led to bigger successes and huge opportunities to reach more children, youth, and adults.

From 2005 through 2014, PAF has received numerous awards and recognition by the Native Hawai'ian Educational Council, the Hawai'i Department of Education and the Hawai'i Historic Foundation for its work in developing a "new model" for culture-based education, preservation, and stewardship of the environment in Hawai'i. Since then PAF has been invited and received opportunities to expand its curriculum development to Hawai'i's coral reef systems, other ahupua'a (land division from mountain to the sea) throughout the state, the Island of Kahoolawe, the science of Tsunamis, global climate change, and sea-level rise.

In 2011, PAF was selected to be a fiscal sponsor for the Hawai'i Department of Education Castle-Kahuku Complex of 31 schools. This was an unprecedented step and honor for PAF as part of the first state "re-design" of a local high school. In 2012, PAF was selected by the same complex of public schools to lead the transformation of Castle High School and complex of schools as part of a new community mandate to employ a "community school" concept. The mandate was to develop a culture, place, and project-based curriculum model that creatively utilized the resources of the surrounding community as the "new" community school! PAF's history was perfectly situated to provide the technical expertise to help guide the school in the "paradigm shift" that we hoped to achieve those many years ago.

In October 2013, PAF was successful in signing an agreement to purchase the Waikalua Loko fishpond utilizing federal HUD dollars. It is the first ancient Hawai'ian fishpond to return to "Hawai'ian hands" since the great mahele (division of land) in 1848.

In 2015, the state legislature approved a grant-in aid to help build supplemental educational facilities at the site to further advance the ongoing mission of community-based environmental and cultural education.



*All of the curricula we have developed now come under a simple yet profound concept called "Aloha 'Āina"*

As we approach the new school year in 2017–18, PAF's investments in its visionary programs have not only brought success to Castle High School but has also served other private, public, charter schools, and communities to help guide and lead similar transformations across the island and state. All of the curricula we have developed now come under a simple yet profound concept called "Aloha 'Āina." It can be summed up this way:

- Aloha 'Āina. The term evokes a deep understanding of the inter-relationship between man and his environment (land) and the desire and need to survive in a changing time. It represents a profound inter-connectedness that is linked to everything we need to live life in a responsible and pono (righteous) way.
- Aloha 'Āina has become one of the cornerstones of the Pacific American Foundation in realizing its mission to serve and to help improve lives in a responsible and "pono" way. It is a concept originated in Hawai'i but has broad application to every corner of the world that exists today.
- Aloha 'Āina starts with culture infused in the rigors of a cultural and place-based educational approach that has begun to change the way we learn, live, teach, and inspire the next generation of all Pacific Americans.
- Aloha 'Āina has inspired a whole new generation of learners in Hawai'i to re-connect to the ancient wisdom of the islands with 21st century science to creatively link education, culture and stewardship into a new paradigm for sustainability and career opportunities.
- Aloha 'Āina simply translated means to "Love the Land."

Finally, this extraordinary history in a short but productive time period was recognized by the White House in 2014. As executive director and founder of the Fishpond Preservation Society, I was one of ten individuals in the country to be honored as a Cesar Chavez Champion of Change. Also in 2014, the Hawaii Maoli Organization honored me with its highest honor, Ka Mana O Ke Kanaka (The Spirit of the Man). In 2017, the Native Hawaiian Chamber of Commerce recognized me with its highest award, the O'O.

Over the years, PAF has formed many community partnerships to advance its mission in reaching a broad spectrum of its target community with unique and innovative education programs. Why Education? In the 21st century, one's level of educational attainment is directly proportional to good health, career advancement, employability, and stewardship of both individual and collective resources (community) in the places we choose to live. Further, Hawai'i's unique and isolated geographic conditions have



*...the merging of traditional knowledge still practiced today with 21st-century skills has catalyzed a new and rediscovered formula for how we teach children in the modern age.*

provided the native and indigenous Hawai'ian people of the islands with a rich cultural and sustainable method of living unmatched throughout the world.

Thus, the merging of traditional knowledge still practiced today with 21st century skills has catalyzed a new and rediscovered formula for how we teach children in the modern age.

Since 2000, PAF has successfully developed unique culture-based curricula, meeting rigorous to national and state standards that cover all of the core academic areas of study, including math, science, social studies, and language arts. Its specific intent was to provide more relevant curricula for native Hawai'ian students throughout the state of Hawai'i to help them increase their motivation as engaged learners while also providing a new framework in which to advance student achievement.



Derek Esibill is the Watershed Investigations, Research, Education, and Design (WIRED) program director. He is also PAF's technology coordinator, network administrator, STEM coordinator, and Nature Activities for Learning and Understanding (NALU) studies science and engineering teacher.

## Urban Waterways

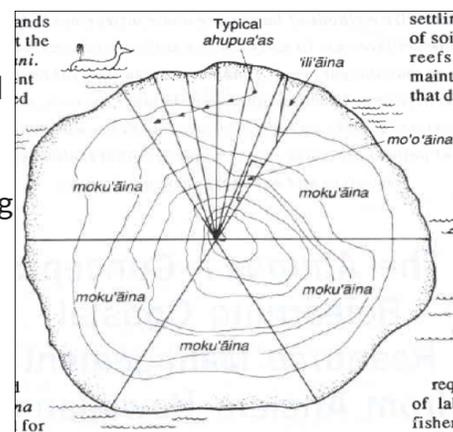
Derek Esibill

The Hawai'ian Islands are one of the most isolated populated landmasses on the planet; the Pew Research Center indicates that the pre-contact Hawai'ian population may have approached one million people. For a society to support a population of that size without importation of foods, it would have needed its agricultural industry to be large and efficient. The culture demanded that this be accomplished in a sustainable harmony, without waste or excessive harm to the environment, which were believed to anger the gods.

Hawai'i's short, well-defined watersheds served as political boundaries in ancient times. Known as ahupua'a, each provided all the natural resources for that community, from trees in upland forests providing material for houses and coastal and voyaging canoes, to low land agricultural fields, to coastal fish farms, to the near-shore reefs. Fresh water (wai), and its pathway from the mountaintops to the ocean guided the developments of communities, agriculture, aquaculture, and society. Wai had such an important place in ancient Hawai'ian culture that the word for wealthy was "waiwai".

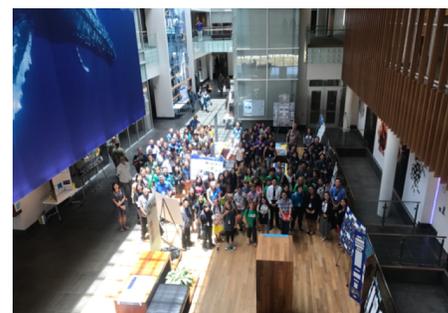
This gave rise to the development of the Pacific American Foundation's Student Science Conference titled "Imi Wai Ola" (meaning seeking the waters of life). Its overarching goal is bringing those organizations, their projects, and most importantly the students they serve together in a symposium venue to share research and collaborate in a non-competitive setting.

The science conference engages students, their mentors, and members of the scientific community in a typical science conference format. Held at the National Atmospheric and Oceanic Administration (NOAA) Daniel Inouye Regional Center on Ford Island, Pearl Harbor, Hawai'i, NOAA has provided a world-class research facility for students to explore and present their work.



Ahupua'a radial land divisions, which recognized interconnections between land and sea.

Credit: Smith & Pai, 1992.

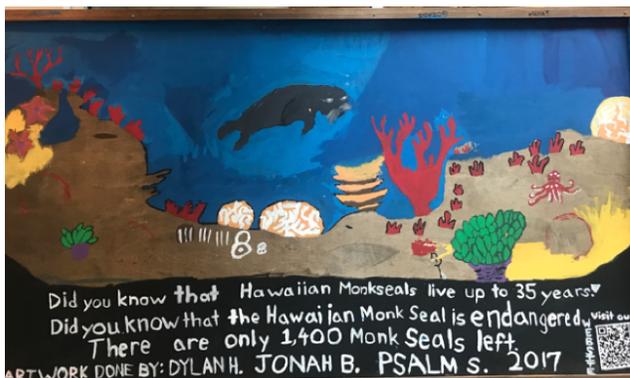


Students gather in the atrium of NOAA's Daniel K. Inouye Regional Center for Imi Wai Ola 2017.

Credit: Derek Esibill

*Breakout discussion sessions also enable participants to explore career pathways and engage in in-depth discussions on current, on-going research with research scientists, biologists, and resource managers from public, academic, and private sectors.*

Participating students represent grades 6 through college undergraduates. They share and defend their projects covering environmental and marine science and engineering.



Poster highlighting the endangered Hawai'ian monk seal. *Credit: Derek Esibill.*



Student giving talk on coral disease and the possible causes. *Credit: Derek Esibill.*

Most of the projects are straight science fair-type projects, such as “A Comparative Analysis of the Biodiversity in a Native Forest and an Introduced Forest” and “Amount of Oxygen Produced by Species of Photosynthetic Sea Slug.” Some are more artistic in nature such as the Endangered Hawai'ian Monk Seal poster (*top left*) while others are more on the Hawai'ian cultural and environmental management end of the spectrum as demonstrated by students comparing the management strategies exhibited in Hawai'i and the Galápagos (*bottom left*).

Students are afforded the opportunity to present their work and answer questions through several formats: on stage in plenary

talks, in less formal poster sessions, and breakout discussions. Breakout discussion sessions also enable participants to explore career pathways and engage in in-depth discussions on current, on going research with research scientists, biologists, and resource managers from public, academic, and private sectors. Imi Wai Ola provides burgeoning young minds with a cross spectrum of career opportunities, project ideas, and areas of study.

In 2017, the second year, 100 students participated, coming from the five islands of O'ahu, Kaua'i, Moloka'i, Maui, and Hawai'i Island. Many students come from underrepresented communities at no cost to any participating student. Pacific American Foundation supports the travel and conference costs using grants from, the U.S. Environmental Protection Agency Environmental Education, the Harold K.L. Castle Foundation, the U.S. Department of Education's Native Hawai'ian Education Act, and the NOAA Education Bay Watershed Environmental Training (B-WET) Program.



*The program will ultimately have our high school students assisting in long-term data collection for the Smithsonian Institution's Marine Global Earth Observatory in Kāne'ōhe Bay.*

Many conference goers had participated in one of several programs hosted by the Pacific American Foundation and/or many have received funding from NOAA B-WET. One such program is Watershed Investigations, Research, Education, and Design (WIRED). The WIRED program engages 6th–12th grade students and teachers with university researchers, graduate students, and undergraduate students, as well as private and public sector entities, such as the Department of Land and Natural Resources in real, current, ongoing, and leading-edge environmental research projects that are relevant to local and global issues. It is the classroom, lab, and field science component of PAF's Kulia Natural Resource Stewardship Program and occurs during the school year, within the school day. The program enables students to collect valid scientific research data creating meaningful outdoor experience that directly benefits the communities explored. WIRED's overarching research question is: *How do land management practices affect our inland, estuarine, and near coastal waters?*



WIRED students investigating the watershed. *Credit: Derek Esibill.*

The KULIA Marine Science Scholars High School after-school club, run by the Smithsonian Institution's Michael Henley, a doctoral candidate of Dr. Mary Hagedorn, builds capacity at the high school level by engaging and training local students in coral reef science through the school year. The program links under-served students from local schools to current research efforts at the Hawai'i Institute of Marine Biology (HIMB), part of the University of Hawai'i at Mānoa, where the program is run. The program will ultimately have our high school students assisting in long-term data collection for the Smithsonian Institution's Marine Global Earth Observatory in Kāne'ōhe Bay. It is part of a culturally appropriate, linked system we are building to provide students with pathways into science and reef management careers by using the cutting-edge tools



Marine Science Club and REMS students engaged in exploration. *Credit: Malia Rivera.*



*The goal of the program is to increase interest in marine science fields among students whose ethnicities are underrepresented in marine science majors at the University of Hawai'i at Mānoa.*

our researchers are using, including 3-D video imaging, e-DNA, ARMS, and biofilms assessments. Its sister program, hosted by HIMB, Research Experiences in Marine Science (REMS), is an advanced, inquiry-driven and experiential marine biology summer course that builds science and environmental literacy skills for Hawai'i high school students and recent graduates.

The goal of the program is to increase interest in marine science fields among students whose ethnicities are underrepresented in marine science majors at University of Hawai'i at Mānoa. The course is located at Moku o Lo'e (Coconut Island) in Kāne'ōhe Bay and utilizes the expertise of HIMB researchers whose specialties demonstrate how human impacts and global change affect coral reef ecosystems. The program provides students with a meaningful and robust introduction to marine biology and scientific research, as well as an improved understanding of the connection between coastal resources and the effects of human impacts and climate change on coral reef ecosystems. Equally important, it builds valuable skills in science literacy and communication, teamwork, leadership, and mentoring.



PaCES students investigating their watershed.  
*Credit: Jayten Galario.*

Students also come from the Windward Community College's Pacific Center for Environmental Studies (PaCES) summer program, an intensive 6-week curriculum providing select Hawai'i high school students with hands-on education and research experiences in some of O'ahu's most pristine environments.

Here students receive a college-level experience rich in environmental studies while embracing Hawai'ian culture. PaCES accesses the unique and natural ridge-to-reef environment (ahupua'a) of the windward side of O'ahu, supported by the classroom facilities at Windward Community College and the Hawai'i Institute of Marine Biology.

Another program that brings participants to the Imi Wai Ola conference is the NALU Studies program (Nature Activities for Learning and Understanding, where at risk students have hands-on, significant experiences that lead to environmental-science education in Hawai'i. NALU Studies offers an alternative opportunity for learning that is integrated and holistic in its approach to Western sciences. Using the surrounding environment of land and sea along with Hawai'i's cultural history and knowledge, NALU Studies cultivates students' curiosity and interest through enriched science education opportunities in marine



*In ancient Hawai'i, it was said to plan seven generations ahead. Maybe this conference is one way that thinking can be rekindled.*

science, biology, and ecology. Beyond academic learning, NALU Studies strives to transform and empower the lives of youth by building trusting relationships and providing guidance and mentoring with an opportunity to experience personal achievement.



Figure 8 NALU Studies at risk students are able to earn high school and college credit  
Photo Credit 'Auli'i Aweau

The Imi Wai Ola Student Science Conference enables a diverse group of students from all over the state to engage with each other in intellectual conversation regarding environmental issues that directly pertain to them. It is those students who will be the architects of the solutions for the problems left to them by the generation before them. Keeping in mind that people only take care of things they care about, these students scientists have develop a deep and profound care for their environment, aloha āina. In ancient Hawai'i, it was said to plan seven generations ahead, maybe this conference is one way that thinking can be rekindled. For more information, please visit the Pacific American Foundation's [website](#).



*Kenneth Kaneshiro is a member of the research faculty in the Pacific Biosciences Research Center, School of Ocean and Earth Science and Technology at the University of Hawai'i at Manoa.*

*Yvonne L. Chan is the John Kay Teaching Chair in Research Science at 'Iolani School where she teaches independent research to grades 9–12.*

*Megan Kawatachi is currently pursuing her PhD in educational leadership from Lesley University, Graduate School of Education, and is privileged to serve as director of Sullivan Center Innovation and Leadership at 'Iolani School.*

## **Learning Science by Doing Science that Matters: Nā Wai 'Ēkolu and The Ala Wai Watershed Restoration Project**

Kenneth Y. Kaneshiro, Yvonne L. Chan, and Megan Kawatachi

Prior to the construction of the Ala Wai Canal in 1928, the area that is Waikīkī today was an expansive natural wetland used for taro fields, duck ponds and fishponds. The canal was originally designed to serve as a drainage for three stream systems: Makiki, Mānoa, and Pālolo streams which comprise the Ala Wai Watershed. When completed, the Ala Wai Canal became, in effect, a 2-mile long artificial estuary in one of the most densely populated regions of the state of Hawai'i with approximately 150,000 residents crammed into a total land area of 16.3 square miles. On any given day, more than 400,000 people may be concentrated in the tiny Waikīkī sub-area of only 8.8 square miles, where 250,000 vehicles travel its meager 1.8 miles of road daily. With the intense urbanization and public use, it is no wonder that in just eight decades after its construction, the Ala Wai Canal and its feeder streams have earned the reputation of being some of the most polluted waterbodies in the state, regularly exceeding most state standards for pesticides, nutrients, bacteria, and sediments. Flooding originating in the upper valleys of Makiki, Mānoa and Pālolo valleys combined with run-off from the city's infrastructure into the storm drain system has long been recognized as being at the root of the water quality problem in the Ala Wai Canal.



The Makiki, Mānoa and Pālolo streams flow into the Ala Wai Canal.



The Ala Wai Canal on a rainy day.

### **The Emerging Field of Sustainability Science**

There is an urgent need to develop the underlying theory and principles of the emerging field of “sustainability science” based on an understanding of the fundamental interactions between nature and humans. This requires a new research and education paradigm that embraces biocomplexity, integrates the physical, biological and social sciences, and uses a “coupled human-natural systems approach.”

Ancient Hawai'ians lived sustainably on this remote island archipelago, with hundreds of thousands of people on the islands prior to European contact; a number similar to current population estimates. Hawai'i's land division system,



*Clean fresh water is the most important natural resource of island ecosystems.*

known by ancient Hawai'ians as *Ahupua'a*, span biophysical gradients from upland tropical forests to the fringing coral reefs (i.e. from the top of the mountain into the sea). Each ahupua'a typically contained all the resources needed to support the community—fish from the shore, fertile land to grow taro, and trees in the uplands—what we would now refer to as a watershed. For Native Hawai'ians, laulima (cooperation) and sharing of resources served as a foundation for sustainable and healthy ahupua'a, including the systems of fresh water streams around which communities organically organized. The mālama (care) and respect for the water was of critical importance, not only for drinking, bathing, and fishing, but also for the extensive, highly effective, and life-giving systems of irrigation for agriculture and aquaculture. Sustainability was maintained by a kapu system that among other things, enforced the purity of the upper watershed, timing of fishing to guard against depletion of resources, and the harvesting of certain plants. It was through careful observation that Hawai'ians stopped polluting and made these islands the most sustainable in the Pacific.

#### **Linking Culture, Place, and Science Through Observation and Citizen Science**

Ancient Hawai'ians developed a system for these islands that enabled their communities to live sustainability. Through careful observation, they were able to develop technologies such as fishponds and extensive agriculture that permitted sustainable living.

Clean fresh water is the most important natural resource of island ecosystems. However, land-use change and the incursion of invasive alien species have had significant impact on the survival and resilience of natural ecosystem function with accompanying impact on the quality and quantity of clean fresh water. Pacific island mountain-to-sea catchments are representative of the dynamics of human-natural systems and the transformations that occur due to anthropogenic interventions as well as the impact of global environmental change. Today, the ahupua'a still provide an important framework for investigating ecosystem services and serve as a microcosm of regional and continental scale processes and environmental issues.

#### **The Hawaii Exemplary State Foundation**

The Hawaii Exemplary State Foundation (HESF) was established as a 501(c)3, non-profit organization, in August 2015. Its mission is to empower local and regional communities to ensure their own resiliency, sustainability, and continuity as well as their ability to thrive socially, culturally, economically, and environmentally, through the integration of traditional place-based knowledge with modern scientific technologies in the formulation of solution strategies within the global commons. It offers a comprehensive, integrative systems approach model for facilitating and coordinating the collaboration of government agencies, civil society organizations, local business enterprises, and academic institutions including lower (K–12) and higher (universities and colleges) education school systems.



*Focusing on 21st-century learning skills, the Center includes an innovation lab, flexible project spaces, collaboration classrooms, a digital media lab, a rooftop garden and a research lab.*

### **Enhancing STEM Education Within the Ala Wai Watershed Complex**

To effectively integrate the culturally based, ahupua'a concept with modern scientific technologies in K–12 education, HESF has used the ancient model of observation that the Hawai'ian's used to develop their ahupua'a system which we now consider as the model for citizen science. Citizen science engages schools, teachers, and students to collect scientific data that is pertinent and relevant to problems affecting the local community. Whether it is to monitor the health of the watershed, track threatened species, or understand threats to human health, citizen science encourages schools, teachers, and students to step outside and observe the real world, not just to learn about it, but to study it in a scientific, repeatable, and useful way. Students collect data with a focus on problems and questions that are relevant to the local community where the schools are located. Citizen Science also engages researchers, government agencies and schools to become partners, increasing the connection between K–12 and higher education and community and government organization experts. By engaging schools in citizen science, the participants assume the role of observers, as the ancient Hawai'ians were. By careful observation and collections of scientific data, they can put their observations in context and gain a holistic understanding of the interconnectedness of the ahupua'a and the watershed ecosystem.

'Iolani School, a private school located in urban Honolulu, is located right on the Ala Wai Canal, where the Mānoa-Pālolo stream enters the canal. In 2010, the school began a collaboration with the Center for Conservation Research and Training at the University of Hawai'i to collect biodiversity and water quality data on the Ala Wai Watershed. A long time teacher at 'Iolani School, Jack Kay had a vision of building a resource for STEM education in Hawai'i. He envisioned providing the resources, space, and expertise to support K–12 students to not just learn about Hawai'i's natural world, but actively collect data and work towards solving its most pressing problems. This collaboration connected stream biologists to K–12 students and teachers, enabling them to work together to collect data on water quality and stream biodiversity.

Mr. Kay's vision came to fruition in 2013 when the Sullivan Center for Innovation and Leadership was built on the 'Iolani School campus. The Sullivan Center is a sustainably-designed 40,000-square-foot, four-story facility dedicated to citizenship, applied technology, scientific discovery, and digital-communication. Focusing on 21st century learning skills, the Center includes an innovation lab, flexible project spaces, collaboration classrooms, a digital media lab, a rooftop garden, and a research lab. The research Wet Lab on the fourth floor has become a resource for the STEM community, and its director has explicit goals to nurture student independent research, foster citizen science among schools and communities, and provide outreach and workshops to improve STEM education in Hawai'i.



*In 2015, 'Iolani School hired Corey Yap, a stream biologist who led the citizen science effort in the Ala Wai Watershed, collecting stream biodiversity data. Mr. Yap was not just a scientist working with teachers, but an educator that became part of the K–12 community.*

### **Best Practices in Community Engagement Connected by Citizen Science**

To reach out to other schools and engage the community, 'Iolani School began a series of learning communities called Nā Wai 'Ekolu, referring to the three waters that connect the Ala Wai Watershed Complex. Educators from public, private, and charter schools along the Mānoa, Makiki, and Pālolo streams were invited to build a community of learners who would understand, know, and care for the watershed; to laulima and mālama through citizen science.

In 2015, 'Iolani School hired Corey Yap, a stream biologist who led the citizen science effort in the Ala Wai Watershed, collecting stream biodiversity data. Mr. Yap was not just a scientist working with teachers, but an educator who became part of the K-12 community. Over 18 months, he was able to teach nearly 4,500 students and 850 educators from 27 educational institutions on O'ahu. He developed a curriculum of three stream lessons that culminated in taking students and teachers into the stream to catch, identify, and count stream animals. For most, this was their first experience out in the streams adjacent to their schools experiencing the hordes of invasive catfish and seeing the unique endemic freshwater 'o'opu (goby) and 'opae (shrimp) of the Hawai'ian islands.

'Iolani School seeks to provide the scientific equipment, training, and curriculum that enables schools to participate in building a scientific database of information, in analyzing and interpreting data used to monitor and manage watershed health, and develop a greater scientific understanding of watershed biodiversity, climate, and issues such as infectious disease, flood mitigation, and pollution.

This multi-school, collaborative citizen science project connects institutions within the Ala Wai Watershed Complex through outdoor, experiential, "in the stream" collection of biodiversity and water quality data; the training of educators and students on the assessment and monitoring of watershed health; the depositing and sharing of data through an online portal accessible to the public including K–12 classrooms and researchers; and the investigation of how data can be used for watershed conservation, management, and action.



Students from schools in the Ala Wai Watershed participate in citizen science, collecting stream biodiversity data and practicing stream restoration by removing invasive species.



*This hands-on citizen science research project is a powerful way for teachers and students to connect with the natural world, build an affinity for the health of the ecosystem, and solve a pressing real-world problem.*

Now participating teachers have a common experience, a common data set, in addition to sharing the three streams in the watershed. When teachers gather together during the evening Nā Wai 'Ekolu dinner meetings they are able to see the data they collected in context with other schools and other streams. This hands-on citizen science research project is a powerful way for teachers and students to connect with the natural world, build an affinity for the health of the ecosystem, and solve a pressing real-world problem. An additional benefit is the integration of modern scientific approaches and traditional cultural knowledge into curriculum designed to foster a sense of place through a Hawai'ian framework.



Teachers from schools in the Ala Wai Watershed Complex share data and ideas as part of Nā Wai 'Ekolu.

We seek to create a learning community among the teachers and schools that are located within the Ala Wai Watershed Complex so that students are empowered with the means, through data and knowledge, to track the health of their place. Through citizen science research, students begin to respect and commit to the health of their ecosystem and, ultimately, make predictions and offer solutions to the issues that challenge the health of their watershed.

For more information:

[www.youtube.com/watch?v=ebCRT3ibLsw&feature=youtu.be](http://www.youtube.com/watch?v=ebCRT3ibLsw&feature=youtu.be)

[www.youtube.com/watch?v=zHjss2iaLc8](http://www.youtube.com/watch?v=zHjss2iaLc8)

*Na Wai 'Ekolu and the Ala Wai Watershed Restoration Project at 'Iolani school was generously supported by ABC stores, EE Ford Foundation, and the Kokame family.*

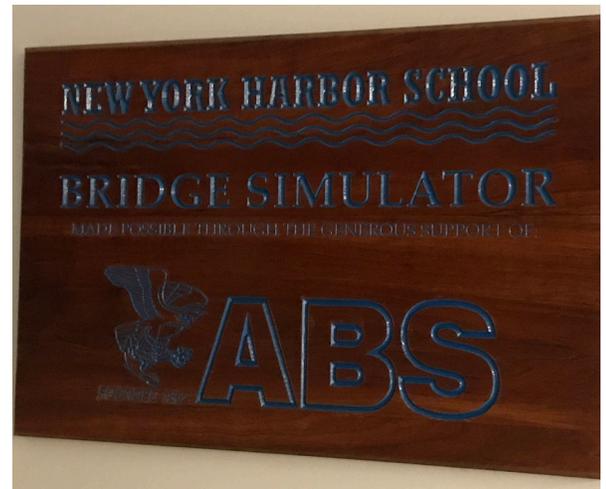
Katrina D. Lashley is program coordinator of Urban Waterways at the Anacostia Community Museum. She received her BA in English literature and Italian at Rutgers University and MA in history (public history track) at American University with a focus on the British Caribbean.

## *The New York Harbor School*

Katrina D. Lashley

Some of Murray Fisher's earliest memories from growing up on a farm just west of Richmond, Virginia, are connected to a deep affection for the natural world. His memories also recall an awareness of and a frustration at its destruction. Fisher was also acutely aware of a feeling of a lack of justice and fairness around the vision of a multi-cultural American society. In his senior year at Vanderbilt, Murray read John Cronin and Robert F. Kennedy Jr.'s *The RiverKeepers*, which chronicles efforts of fishermen who organized to protect the Hudson River. The book managed to bring together two communities of which Fisher was a part but often seemed incompatible. *"I had always cared about environmental groups, and I was a member of Greenpeace, but I was also a member of the Ducks Unlimited, and I felt like I loved going out and hunting ... going out and fishing were ways I developed a very intimate relationship with the natural world; and it was frustrating to me that all the people of Greenpeace didn't understand that, and at the same time it was frustrating to me that hunters seem to care more about actually killing the animal than thinking about ecologically and biodiversity."*

Convinced he had found his path, Fisher reached out to Kennedy, eventually getting the opportunity to interview him. In the fall of 1998, through AmeriCorps, he started work with RiverKeeper. His work consisted of presenting to various stakeholders, investigating water-pollution complaints, conducting educational programs on the Hudson River, and collaborating on the foundation of a museum about the history of the Hudson and the environmental movement. *"My brain was turned on intensely for the first time in a long time. You know, I had always been a pretty good student, but only because I was competitive and wanted to do well, not because of my love of the learning of it, and this, I was really loving it; and so on the Hudson River, I read dozens of books about the Hudson River, at night I would be going to meetings about the Hudson River; and oddly, I remember that I immediately knew all of the geography of the Hudson River in a way that I never knew about my own river, the James River, in Virginia."*





*"Let's put all this excitement and energy that I've discovered is out there about the Hudson River and make it school, because all those things that I cared about in terms of social justice and environmental restoration protection were all secondary throughout my entire school."*

*—Murray Fisher*

One day, while working with some New York State Department of Environmental Conservation scientists tagging and sexing fish in the town of Athens, something struck him. *"I remember feeling this is how school should have been, school should be doing this, and I remember thinking there should be a Hudson River school. Let's put all this excitement and energy that I've discovered is out there about the Hudson River and make it school, because all those things that I cared about in terms of social justice and environmental restoration protection were all secondary throughout my entire school. I wanted to be working on those things all the time since I was a kid, and so it was frustrating to put aside my deep interests to just go through school for so long."*

Fisher didn't act on his idea right away. His next steps took him to the Water Keeper Alliance, the umbrella organization for all riverkeepers, which was in its founding stages. As its first employee, he helped to design its website, create its logo, and support river and bay keepers around the country. His work under his official title of Field Coordinator entailed vetting potential new programs, reviewing proposals and working with communities nationally and internationally. During his time with the Water Keeper Alliance, Fisher was struck by the absence of a central training center for water keepers and the lack of diversity of the movement. *"I visited all these people around the world, mostly around the country, but it was almost entirely older, white men. Very few young people, very few women, very few people of color, and it felt to me, two things: It didn't feel fair because clearly there weren't equal opportunities for this kind of work, so it wasn't fair that it wasn't more representative, but the other thing is, it also felt like if this is a group of people dedicated to preserving our aquatic and marine ecosystems, we are going to lose if we are such a small segment of society. So how do we make this kind of passion, these kinds of skills, this kind of access, this kind of knowledge more readily accessible to more people?"* He came up with a concept and shared it with his roommates, one of whom suggested Fisher talk to his uncle, Richard Kahan, who had just started the Bronx School of Law, Government, and Justice. The meeting between Fisher and Kahan proved to be fortuitous; that fall then-Mayor Bloomberg had issued an RFP for new small schools. A decade earlier, Kahan had created the Urban Assembly, a non-profit dedicated to sharing best practices in cities around the world. After being approached by Fisher in regards to the Water Keeper Academy and principal Joan Sullivan about starting Bronx Letters, a school dedicated to reading and writing, Kahan reached out to the Department of Education and then school chancellor Joel Klein about Urban Assembly establishing and managing schools.

Fisher next reached out to the South Street Seaport Museum whose then-director, Peter Neil, had helped to found the Sound School in Newport, Connecticut, and was interested in helping to establish what had



*The foundational aim of the school, Fisher stresses, was to provide a broad education with New York Harbor as the centerpiece.*

become the Harbor School. The choice of New York Harbor as the focus of the school came out of a meeting with environmental lawyer Al Butzel. Fisher had been intending to call the school the River School after the Hudson River; that idea gave way to the Water School, and the Ocean school was also suggested. *“New York Harbor doesn’t have an identity or constituency really; the Hudson River does, Jamaica Bay does, Long Island Sound does, even the Harlem River does, even Gowanus Canal does, even Newtown Creek does, even Raritan Bay does, Hackensack River does, Raritan River does; obviously the Atlantic Ocean right here does, but all these things together is like the tragedy of common, where we all are is New York Harbor and yet there is no constituency for New York Harbor. And so there is a void that we started to fill immediately ... but what was best about the name New York Harbor, both for the school but as an actual geographic and hydrological ecological place was that you can’t focus just on the estuary or the ecology, nor can you just focus on the port and the maritime commerce, people think that you have to always make that choice. Right, are you all about oysters, fish and water quality, or are you all about jobs and kids and boats. And our point is, we are about all of it, because New York Harbor is about all of it.”* The foundational aim of the school, Fisher stresses, was to provide a broad education with New York Harbor as the centerpiece. Students would learn their career and technical skills, and maritime training through the restoration of an eco-system.

New York Harbor is generally defined by the U.S. Environmental Protection Agency as the body of water surrounding New York City fed by the tidal portions of all the rivers that flow into it, including the Bronx River, the Hutchinson River, the Hudson River, the Hackensack River, the Passaic River, the Raritan River, the Navesink River, and the Shrewsbury River. The third largest port in the United States, with the raising of the Bayonne Bridge to allow bigger container ships entry, the harbor will continue in its role as a big employer in the city through its prominence as a global port.

Due to the absence of dams on the main stem of the Hudson, the river still has retained fairly strong spawning stocks of all of its native indigenous, anadromous fish. Fish that have historically, for thousands of years, swum up out of the ocean up the Hudson River to spawn continue to do that. The dominant feature of this entire ecosystem was historically oysters. Due to the impacts of colonists and New Yorkers during the 300 years after European settlement, by the early 1900s there were so few oysters, people were getting sick eating them, and the water was so polluted that oysters were forgotten in New York City. Any that were left died, were dredged up, or were covered over with sediment leading to what Fisher calls “a case of dramatic amnesia.”



*From the start, the school focused on building a strong relationship with community residents who were predominately Latino and African-American ... with a small percentage of Asian and other nationalities.*

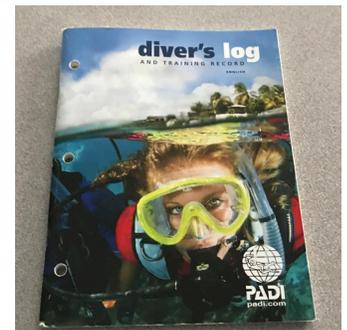
The school's first location seemed a contradiction to the school's goal of battling the disconnection between the harbor and the city's residents. Efforts on the part of the Department of Education to phase out their four largest and worst performing high schools included Bushwick, Brooklyn. The four schools would be replaced by twelve small-themed schools. As part of the Brooklyn New Century Initiative, teams were trained in how to prepare their proposal and tasked with finding school leaders. Based on a recommendation from Hunter College's Principal Certification Program, Fisher reached out to Nate Dudley, a teacher in the Bronx who agreed to come on board as the school's principal. In April of 2003, the school was approved and assigned to Bushwick. Prospect Heights, where the team had placed its focus, was the closet location to the harbor, but Bushwick had a pool. In the fall of 2003, the New York Harbor School opened on the third floor of the Bushwick High School annex with 125 students and eight teachers. They found themselves in a community facing a variety of social and economic challenges. Of the 700 freshmen at the original Bushwick High School that was still being phased out, 39 graduated. From the start, the school focused on building a strong relationship with community residents who were predominately Latino and African-American, with a small percentage of Asian and other nationalities. *"We started telling the Bushwick community pretty early that we love this community and we were welcomed so warmly here, and very few people questioned us, doubted us. Most of the immigrants were from the Dominican Republic. Nate and I really thrived in the community, people could tell that we cared. We are both fluent in Spanish, which I think made a big difference."*

The mission of the school was to use New York Harbor to prepare students for college but to also provide them with maritime and marine-focused skills. The curriculum was created by a group of teachers, some who are still integral parts of the school's faculty. Roy Arezzo focused on preserving, restoring, and using New York Harbor, the environment, and marine biology. Brendon Malone, a shipwright at South Street Seaport Museum, created a marine technology class, and Ann Fraioli focused on access to restored ecosystems as a tool for social justice. *"We all were just equals, creating this school together. The curriculum had to have the basic Regents preparation. Regents are the state exit exams, you can't graduate without a certain number of Regents credits. And so you have to teach the English regents, to the math regents to the global history regents to the U.S. history regents and then two science regents. Then you have requirements for art, P.E., and special education."* In addition to fulfilling requirements, the curriculum had to incorporate the harbor. Their solution, Introduction to New York Harbor, was made possible by a partnership with the South Street Seaport Museum. Every day the school's assistant principal traveled with 25 students to take classes often on board the museum's main ship,

*"The really great thing that has happened is that for the kids, they choose a program and then that's their game, they communicate with each other, they are totally diverse and working on really complicated things."*

*—Murray Fisher*

the *Lettie G. Howard*, which would go on to serve as a floating classroom for the school's first five years. Throughout the course of their freshman year, all 125 students were sent to eighteen different sites around New York Harbor. They took part in water monitoring, checked oyster restoration sites, learned about the ecology, weather, and climate of local sites, and interacted with the people who worked there. It was an opportunity for students to learn not only about the natural world, but also the built environment.



Diver's Log.

One key frustration for leadership and faculty were the skills students would need in the real world but were difficult to fund with support from the city. *"Water keepers have to ... under the law, they have to understand how to drive a boat, they have to understand the basic science; it would be great if they could scuba dive to go check out what's under the water, there's all that. They have to understand how to maintain a boat ..."* One possible avenue to pursue was Career in Technical Education (CTE). Schools that were teaching what has been historically considered vocational skills were receiving support in addition to regular per-student funding. Starting in 2006, the school worked on creating CTE programs. By the time all six programs (Aquaculture, Marine Biology Research, Marine Systems Technology, Ocean Engineering, Professional Scuba Diving, and Vessel Operations) were approved by the state in 2012–2013 there was no extra funding available. School leadership found themselves tasked with maintaining four years of curriculum and six state certification programs. This challenge led to the creation of the [New York Harbor Foundation](#), a non-profit tasked with raising support for the school.

The creation of the CTE programs had lasting impacts on the culture of the school. *"The really great thing that has happened is that for the kids, they choose a program and then that's their game, they communicate with each other, they are totally diverse and working on really complicated things. If you are tending the line of your fellow student who is underwater at New York Harbor at a reef—their life is literally in your hands. And so the CTE program provides the incredible place where previous academic experience can be irrelevant, your background, what you look like, who you are friends with, what school you went to, how smart you may or may not be perceived to be, none of it matters, because it is so skills-based, and it is so new and different for everybody."* The goal of the school is to provide students with options—college or direct entry into the workforce. Such a goal requires more college advising and career- and tech-ed teaching and training than the school can afford, but students naturally see the connections between what they learn in class and out in the field. They recognize they are learning transferable skills.

*The question before them was such a goal possible? Could oysters survive in New York Harbor?*

## **The Billion Oyster Project**



Billion Oyster Project lifecycle panels line the wall of one the school's hallways.

The transferable nature of their skills is reflected to its fullest in the [Billion Oyster Project](#). In 2008, Pete Malinowski, the project's executive director, joined the school as a volunteer. Malinowski brought his experience learned growing up on the Fisher Island Oyster Farm. He eventually took over the Harbor Corps—a Saturday program where students worked to monitor oyster nets and the growth rate and mortality of different oysters —located at twenty sites around the Harbor. Data was reported back to the New York/New Jersey bay keeper. Discussions soon turned to scaling up the program. Preparations for a move to Governor's Island had school leadership re-evaluating to what extent could students be further connected to their local ecosystem and how could the school share their knowledge and curriculum with other schools? The publication of Mark Kurlansky's *The Big Oyster*, which told the history of New York City through the rise and fall of the oyster, made the case that the nickname "The Big Apple" could be appropriately replaced with "The Big Oyster." *Million TreesNYC* was underway to plant and care for one million trees across the five boroughs. What could you plant in a harbor? A billion oysters.

The question before them was such a goal possible? Could oysters survive in New York Harbor? Malinowski built a Floating Upwelling System (FLUPSY), a structure with electric pumps that push water through a channel in its core. When oysters are placed in the silo, the flow of water draws water through and over the oysters, removing waste and providing food and oxygen, allowing them to grow twice as fast. He placed 100,000 seed oysters in the structure and brought it out to Governors Island. They grew to become the largest density of oysters in New York for a century. The next step they took was to test three limiting factors: the availability of substrate, oyster shells, for larvae to attach to; the presence of adults in the system spawning and producing enough larvae; and a quality of water that would allow for the survival of larvae as they transform into sessile animals that build their own shells. *"Pete put a big tank that was called a remote setting facility and drew in raw harbor water into it, and we spawned oysters and got oyster larvae, and we put them into the tank with lots of*



*"Our goal is to plant a billion by 2035 and in the process engage New Yorkers and sort of develop a passion for New York Harbor and all New Yorkers."  
—Murray Fisher*

*oyster shells and they set on the shells with raw harbor water, and they survived, and they lived and they grew. And so for the first time not only had we proven that the bay view oysters could grow, we proved that they could grow through that metamorphosis, which is the second really important water quality test. We kept doing this, and then we got a permit to build a big nursery in the Brooklyn Navy Yard in something called Wild about Basin. We put any oysters that we had grown into these big floating nets in one of the dirtiest parts of New York Harbor, and they grew like crazy there. So water quality was no longer a limiting factor." A final question was the number, was a billion possible? They had a long conversation with Malinowski's father, who produces millions of oysters a year, believed that it was possible. They finally spoke to scientists at the Stevens Institute of Technology and asked about the standing volume of New York Harbor, "They told us it is 75 billion gallons. An adult oyster filters 25 gallons a day, so the theory is that if we have a billion adult oysters, they will filter the standing volume of New York Harbor once every three days. And that was impactful for me and Pete, because it made us realize that it would actually be a meaningful intervention into the ecological system ... Our goal is to plant a billion by 2035 and in the process engage New Yorkers and sort of develop a passion for New York Harbor and all New Yorkers."*



Close up of spats.

...student working in the school's hatchery.



Murray Fisher and student in the school's hatchery.

*From the beginning, there was great interest in supporting the Billion Oyster Project. Many saw it as a rallying cry, a way to reconnect New Yorkers to their relationship with waterways that were once much richer.*

With the exception of driving to pick up shells from local restaurants, students are involved in every aspect of the project primarily through their CTE programs. The Aquaculture students spend their sophomore year learning about tanks and systems. During their junior year, they are growing algae for oysters, and their senior year work is growing oysters. The Marine Systems Technology kids are working on maintaining the vessels and they are building the reef infrastructure in their welding class. The Marine Biology Research Program is working on studies about oysters—the reefs, monitoring water quality, what's living there, what kinds of oysters—and are conducting different science projects about the Billion Oyster Project. Students in Ocean Engineering are helping to design the reef infrastructure using computer-aided design. They also use remote-operated vehicles, all autonomous vehicles they design and build to do water monitoring when scuba divers cannot monitor water quality and at the reef sites. The Professional Scuba Diving students build the reefs by hand and monitor them. Rather than pay other commercial divers, Vessel Operations students drive all the boats.



Artificial reefs constructed by students in the Professional Diving Program

The project has also allowed for the participation of seventy-five other schools. Teachers can sign up for training where they receive an oyster restoration station which allows for a snapshot of the local ecosystem. Teachers monitor their stations four times a year with their students, and the Harbor School is developing curriculum to go along with the stations (sixth and seventh grade has already been completed). There are also plans to do sixth-grade science and math curriculum related to the New York Harbor through Billion Oyster Project. Students at various schools will be able to upload their data to a digital platform.

From the beginning, there was great interest in supporting the Billion Oyster Project. Many saw it as a rallying cry, a way to reconnect New Yorkers to their relationship with waterways that were once much richer. A connection with Mark Mattson, a water keeper from Toronto, led to a tour with the Royal Bank of Canada (RBC) which had developed its [Blue Water Project](#). Impressed by what they heard, RBC pledged \$125,000 a year for three years. Fisher was then invited to present at Clinton Global Initiative,



*In 2010, the school moved to the main school facility on Governors Island. The process had started in 2004 when Fisher and Kahan presented to the Island's board.*

a meeting of 3,000 business, non-profit, and political leaders. As part of their commitment to action, Billion Oyster Project pledged to plant ten million oysters. The third important element which helped to support the launch of the project was the collaboration of environmental groups concerned about the care of oysters in the region. The Oyster Restoration and Research Project (ORRP) included groups like the Hudson River Foundation, New York/New Jersey Bay Keeper, the Port Authority, the Harbor Estuary Plan, and the River Project. Harbor School and Harbor Foundation became partners. At the half-way mark of the three-year funding from RBC, Sam Janis, a former Harbor School teacher who was then leading the Billion Oyster Project, in collaboration with Columbia and Pace universities, the New York Aquarium and the River Project, wrote a proposal to the National Science Foundation which granted a five million dollar award to create BOP curriculum for schools. With all of the pieces falling into place, it was decided the project was ready to go public in April of 2014. *"We realized that this thing was real and we had to stop keeping it internal, and we had to get it out to the public ... at the time we had seven employees at the Foundation, about two of whom had been working on the Billion Oyster Project, and now there are twenty-seven employees, twenty-five of whom are working on Billion Oyster Project."*

The growth of the Billion Oyster Project has mirrored the growth of the school. From a third-floor annex at the Bushwick Campus to the fourth floor of the main school building a year later, leadership fulfilled its goal of being on the water. In 2010, the school moved to the main school facility on Governors Island. The process had started in 2004 when Fisher and Kahan presented to the Island's board. Fisher had been out to the site two years prior. *"A hundred, empty, historic Coast Guard buildings in the middle of New York Harbor just seemed like a great place for a high school about this stuff. So we had been sort of pushing on Governors Island, at the same time, we never knew if this would happen, and I had 18 different places that I pursued over the course of the next four years, Hunts Point in the Bronx, Pier 40 in Manhattan, South Street Seaport Museum in Manhattan, Newtown Creek, three different sites, Iguanas Canal, two sites, Floyd Bennett Field, two sites in Staten Island, two sites in Queens, down in Dumbo at the base of a development. Each one of those efforts required plans that we would create with architects and contractors, working with local politicians, trying to find financing, trying to get the school construction authority on board, each effort was a really long, big effort. I was doing that on the side, while still trying to help run and manage Harbor School, and Richard Kahan was helping me each time with connections to local politicians or developers."*

Despite efforts to focus on other sites, Governors Island remained the most logical choice. In November 2006, the Island issued an RFP for proposals. The school was one of thirty-five respondents which included



*"... I think that when we were in Bushwick it was almost 100% black and Hispanic. And now we have about 40% Hispanic, 30% African American, and 30% white, and it is actually a truly integrated school in a lot of ways schools aren't. And we are really proud of that."*

*—Murray Fisher*

the Robin Hood Foundation, Knowledge is Power, and Nickelodeon. The school was the only one to win. Fisher points to the support of a multitude of community groups and the support of Kahan and the Department of Education which agreed to fund the school if it was selected. A 99-year lease was signed, and in 2008, a five-year, million dollar capital campaign to renovate the chosen building was initiated. In September of 2010 students moved in.

One concern regarding the move was the impact it could have on the student body. Currently, New York City students are used to traveling to selective schools, but at the time it was unusual for them to have to travel so far. *"We went from being a school that had about 98% of our kids living below poverty in Bushwick, now we are at about 55%. I think actually right now it is a great mixture of kids. I think that when we were in Bushwick it was almost 100% black and Hispanic. And now we have about 40% Hispanic, 30% African American, and 30% white, and it is actually a truly integrated school in a lot of ways schools are not. And we are really proud of that."* One way to slow the trend of becoming more and more middle class was the Billion Oyster Project. Most of the seventy-five schools participating in BOP are Title I. Students are given an opportunity to interact with the Harbor, dirty their hands, go out on boats, and visit Governors Island. The project has proven to be an effective recruiting tool. When the 88,000 eighth graders in New York City Public Schools fill out their high school choice form, a growing number of students who choose the Harbor School have already participated in BOP.

When asked what advice he would give to those who are embarking on the foundation of schools that use their communities natural resources as learning tools, Fisher points to the importance of hiring the best possible staff. *"They will determine what the school is, they will determine the culture of the school, and schools will rise and fall based upon that first class."* The next important piece is the importance of location. *"One of the critical planning and physical limitations to having young people who believe they can make a career working in or on the water is that they physically can't get to it. People are loathe to give waterfront property to public school kids, and that is a fight that we fought; and we are still fighting it. Making money is always trying to supersede public education, and that waterfront space to me, particularly around issues of justice for a community to have equal access to what hopefully is an increase in the vibrant and abundant bio-diverse place, is critical."* The reluctance to value student access to waterfronts as a step to healthier, equitable, and more sustainable communities reflects the importance of the third important element Fisher points to as part of the school's success. *"There has to be key, powerful relationships that can throw a life preserver to the school when it is about to go under. I had one person who gave us \$100,000 a year for ten years. And it was only in hindsight that I*



*realized, 'well that paid for more than my salary, so for ten years I didn't have to worry about raising my own salary.' Only looking back did I realize 'wow, one donor kind of made it all happen.' Having several, very powerful relationships is critical, if everything goes well you are OK, but without it, if things don't go well, you need those people to cling to.'*



*Programming underscores the obligation of cultural institutions to be extensions of their surrounding communities by addressing issues of health, sustainability, equitable development, and the use of natural resources within urban communities.*

## **Anacostia Community Museum Community Garden**

Katrina D. Lashley

Entering its eighth year, **Urban Waterways** has been guided by the precept that museums should be reflections of the communities they serve—active spaces in which residents see themselves reflected in exhibitions and programming which, while celebrating the accomplishments of the past, honestly explore the roots and realities of their present. Going a step further, museums should provide tools and resources in which residents are empowered to address issues relevant to their daily concerns and take steps to ensure the development of healthy, viable communities.

ACM's *Garden to Table* and its parallel school initiative, *A Year in the Garden*, are a reflection of the museum's commitment to community engagement and empowerment and **Urban Waterways'** exploration of the multitude of issues at play in the creation of healthy communities. Our programming underscores the obligation of cultural institutions to be extensions of their surrounding communities by addressing issues of health, sustainability, equitable development, and the use of natural resources within urban communities. It also seeks to dispel the narrative that urban residents are separate from their natural world and issues impacting the health of residents, urban waterways, and their environs exist and operate in isolation. Through our various programs, residents of all ages are being reconnected to the beauty of their natural world, the importance of the creation and maintenance of a healthy food system, the excitement of *physically* exploring their surroundings, and their roles in the various communities in which they can play active roles.



Derek Thomas demonstrating planting techniques.  
Credit: Linda Maxwell.



Visitors planting the garden.  
Credit: Linda Maxwell.

*Derek Thomas has been nationally recognized for his garden design work. He is founder and president of Thomas Landscapes LLC in Washington, DC.*

## *Creating Sustainable Gardens for Today's Urban Gardeners. A Path to Return to Gardening.*

Derek Thomas

Some of the challenges facing today's urban gardeners go beyond the physical challenges we encounter in city living. The challenges of urban life, the way we live our day-to-day life, rushing from task to task, almost negates the spirit needed for any garden to work. An urban garden requires a commitment from its owner to being grounded in the now. Remember, gardening requires a time commitment in caring for something without the guarantee of any reimbursement. Gardening requires us to look back to our roots and to a time in the not too distant past where computers and phones and digital calendars did not command us. Gardening requires us to be silent, to listen to the earth, and embrace its majestic green side, a side where the compost and weeds and rainwater replace the trappings of our day-to-day life if only for a few hours at a time.

### **Where the Movement (Moment) Must Start**

Gardening can be fun: planting a seed, watching it grow, nurturing it to a size that can be transplanted out into the open ground, waiting 60 to 90 days before harvesting your first vegetable, all this can be a very rewarding process if the garden's steward has perseverance and patience. A gardener must be committed to the process of nurture. Plants need routine care in order for them to thrive. In fact gardening can be hard work, and gardening can have many challenges. However, the rewards are so immense that in spite of our cities enveloping our countryside gardens still grow. Urban gardening is a movement with feet, and arms, and a whole lot of heat. A garden connects us to our past in an instant and in a way that few other activities can. Once upon a time we all gardened or the family did not eat. A garden gives us a joy of producing something and builds our pride of being sustainable. A garden feeds not only us in a physical sense, but greater and more importantly a garden feeds our intrinsic desire to be connected to mother earth.



Container gardens on a roof top patio.  
Credit: Derek Thomas.



*We as a community should not accept the term “food desert” as a description of where we live.*

Another great challenge that we face as urban gardeners (and perhaps this challenge is too great to think that one article or one person can rise above this obstacle) is the generational disconnect with the earth. We have become parents whose children have only known of gardening from the stories that the grandparents may have told. We take the earth for granted since we only have had to “know” of farming; we have never been made to practice it. We are now the second and third generation of non-plant people, who happen to live on the only green planet in our universe. We have lost the connection with the very food that we need to nourish ourselves. Interestingly, one of the unique stressors that we face in communities and neighborhoods east of the Anacostia River lies in a new classification of our communities, and it is a classification that unfortunately we have earned. The U.S. Department of Agriculture now considers our neighborhoods a food desert. Even more shockingly, there is a direct connection with lower incomes and less education in the value of healthy eating in neighborhoods like those east of the river. Our grandparents and great grandparents would be ashamed of such a title.

### **An Image of Desolation. A Rise from the Desert.**

We as a community should not accept the term “food desert” as a description of where we live. We should not, due to our community’s lack of knowledge of gardening, or caring of and for the importance of good healthy eating, apathetically accept a categorization that can be simple to overcome. How do we break this cycle? How do we teach ourselves and more importantly our children, how to garden when we don’t? This classification is one we can all learn to outgrow. Growing a garden can be easy in any income bracket. Learning how to grow a garden can be simply found online. If we take a break from our social media lives and do a search of how to start a garden, the information will flow forth in volumes. There are a lot of great gardening articles on the web. Challenge the children to begin by searching how to grow their favorite vegetables; this is a great way to get them involved with gardening.



Urban garden with tomatoes, cucumbers, and cabbage. *Credit Derek Thomas*



*Due to these very convenient “markets,” many of us have not had the honor to grow with a garden (yes a garden does make one grow ... in many ways).*

Challenge your children’s school to develop, programs that reverse the absence of garden programs in the school's curriculum.

- An art class that draws pictures of the plants that the children grew over the summer.
- An English class that journals the life cycle of a lettuce plant.
- A science class that teaches the process of photosynthesis and why we all need light, air, water for any healthy growth.
- A Biology class teaches the importance of nutrition and how plants provide us with almost all of the nutrients we need.



Early spring cold frames at a D.C. junior high.  
*Credit: Derek Thomas.*

Nurturing a tomato plant on a 10'x5' balcony only requires soil, a planter, water, some tomato food, and love. Pot up sweet potatoes for the beauty of the vines and the dual benefit of potatoes to harvest in fall. Teach a child that a sunflower seed is not something salty and grown in a colorful plastic package, but a seed that in one season, less than ninety days, will grow into a beautiful plant, give you a wonderful flower, and then provide you with a bounty of fresh seeds. Once the sunflower seeds ripen, they can be harvested, shelled, and eaten raw or sprinkle them over your favorite salad. All of this may be hard to get used to given the conveniences of the local grocery store. Due to these very convenient “markets,” many of us have not had the honor to grow with a garden (yes, a garden does make one grow ... in many ways). Fortunately kids, and those who are young at heart can and must learn quickly. With the proper stewardship we can return our children and ourselves to the earth. We are the key to urban gardeners who grow gardens. We can satiate the food desert and turn it into the Victory Garden. It all begins with one sunflower, one sweet potato, one kale plant, and lots and lots of desire to live, learn, grow, and thrive.



Pear tree growing on a roof top garden and detail pears.  
*Credit: Derek Thomas.*



*Put together a checklist of what is important to you. Prioritize the list and then set it into action.*

### **Starting at the Beginning: A Gardeners Checklist**

**1) Planning.** Put together a checklist of what is important to you. Prioritize the list and then set it into action. This can be the most important phase of achieving a great garden. There are many resources available to you during this phase. Perhaps most importantly, be willing to make and learn from mistakes. The quest for garden greatness is ongoing and evolves with time and experience. The best gardens always began with well thought out research and planning.

**2) Site planing.** Urban gardens have to survive in harsh micro-climates, both natural and man-made. A garden has to have at least six hours of direct sun in order to thrive. A garden must have regular watering in order for roots and leaves to be healthy and for harvests to be heavy. A garden must have nutrients available in the soil. Plants use organic material in the earth to produce the vegetables we eat. All of these considerations must go into a good site plan. We must also consider the amount of traffic that our garden could be exposed to. We should plan to have our garden in a protected area where all of the above requirements can be met while keeping our plantings safe from damage. We must also consider animals that will want our vegetables as much as we do and think about humane ways of protecting our plants from nightly visits from any of the animals that may want to forage in our garden.

**3) Exposure.** Take into account the direction that your home faces when choosing your garden plot. Gardens need full sun and lots of it. Planting in the shade will open up your plants to stress, and a stressed plant is a beacon to insects. Healthy plants fend off insects as part of the circle of life. If your garden is getting six or more hours of sun a day, the garden will thrive. Plants will do best if given the proper environment. If your plants are not performing, and you have the soil properly prepared, perhaps the exposure is wrong.

**4) Scale.** The most important thing to consider when plotting out your garden is the space that you are working with. Accept your limitations if this is your first time out. You may want to start with a container garden before you go to a full-on raised garden bed or half-acre plot. Planting one tomato plant and one pepper plant can give you the sense of Garden Nirvana without the angst of an overwhelming commitment. Remember gardening can be rewarding. Taking baby steps as you start to garden is OK. Be realistic about this phase of the development, and enjoy the process without overdoing it. There is always next season for a larger plot.

**5) Time.** Great gardens take time. You must be realistic when planning the garden. How much time do you have to devote to maintaining your garden?



*Enjoy the process, and make your time limitations an asset, not a defect.*

If time is limited, consider planting small to begin with. Many people have found joy in urban gardening by just doing a herb garden to start. This does not mean you are giving up your desire to have a full garden. You are the one who can decide how much involvement your schedule allows. A small garden will need at least two hours a week to maintain. Plan accordingly and remember at every stage this is as much about working in the dirt and being connected with it as it is about winning the state fair for the largest pumpkin! Enjoy the process, and make your time limitations an asset, not a defect.

### **The forgotten component: Soil**

Soil care is perhaps the single most important thing you can do to ensure healthy plants. You can adhere to all the right practices, but if you do not care for the soil the garden is growing in, your rewards will be less than successful.

- Soil is alive.
- Healthy soil has a good balance of inorganic and organic materials.
- Inorganic materials are silt, stones, sand and clay.
- Organic materials are compost, plant clippings, and decaying leaves.
- Good soil management leads to healthy plants, which are not as attractive to insects and disease.

Good soil attracts worms and other healthy nematodes that assist in the biology of soil and plant health.

Inorganic materials are the structure of soil and serve to support plants roots. Without stones and sand and silt our plants would not have anything to permanently root into, and once the organic substance decayed, the plants would be easily uprooted.

Organic materials are the food for your plants. Compost, manure, peat moss, leaf mold, and anything that is basically in a state of decay provide nutrients for our plants to live and grow.

Clay and subsoil are an often forgotten yet very important part of the growing equation. Clay is loaded with naturally occurring micronutrients that are necessary for healthy plant growth. Clay can be fertile, and it holds moisture and nutrients. The first thing you have to accept is that, short of having your yard excavated and refilled, you *cannot* turn that clay into something it is not. But you *can* amend the soil enough to make it into a good growing medium for a wide variety of plants. And by choosing plants that prefer a heavier soil, you can create a lush and productive garden with minimal exertion.



**Here are some tips for making the best of the heavy soils in our gardens:**

**1.) Never work the soil when it's wet.** This is good advice for any gardener, but critical if your soil contains a large percentage of clay. Working the soil when it's wet (or walking on it when it's wet) will compact the soil and turn it into a hard, solid mass when it dries.

**2.) Add lots of organic materials.** This will do more to improve the tilth of your soil than just about anything else. When establishing a new bed, be sure to incorporate large quantities (30–50 % by volume) of organic materials, like aged manure, compost, peat moss or humus. Since organic materials decompose relatively quickly, be sure to make it a regular habit to add organic materials to the garden. Consider using a mulch that decomposes in one season, like shredded mulch or hay, to enrich the soil as it decomposes. Side dress your plants each spring with compost or manure. Add compost when moving or dividing plants. Take the time to re-enrich the planting hole before you put a new plant back in. In addition to altering the soil structure, organic materials add lots of micronutrients to the soil.

**3.) Use inorganic additives for long-term changes.** Adding inorganic materials like sand and gypsum can help to alter the structure of the soil for a relatively long period. Just bear in mind that you will have to add very large quantities of these materials to make a significant difference in the soil texture, and you will need to add organic materials to the soil. You might want to rely on inorganic materials on a plant-by-plant basis.

**4.) Keep an eye on the soil pH.** The soil in our area tends to be naturally acidic. To make soil more acidic (lower the pH), add oak leaves, bark, coffee grounds, pine needles, peat moss, or woodchips. To make the soil more alkaline (raise the pH), add oyster shells, dolomitic lime, wood ashes, or Compro. The pH of the soil will affect the availability of nutrients to the plants.

**5. Plant high!** Use raised beds to help improve drainage. This will normally be achieved anyway, as you add lots of organic material to your bed, and increase the volume of the soil.

### **The Movement.**

As with any movement, excitement can flow and ebb. Treating urban gardening as a fad movement will almost surely ensure its end. Urban gardening must be the new norm. It must be something we begin to teach to our children and colleagues and neighbors and friends. It should and must be something we embrace as an indispensable tool to reconnect with the earth. We must see the benefits of growing again for a new generation.



Not because it is being done at the local middle school and we rush over this year to help them out. But because it should be intrinsically incorporated into our lives as something that will help all of us to grow. Remember, the green planet is where we live. The green on our planet is the plants. We can all be a part of the permanent green movement when we plant a recycled bucket full of tomatoes, a planter filled with herbs, a raised backyard garden bed, or a victory garden that feeds the block. It all starts with one seed and a commitment to gardening and growing with the earth. Enjoy!



Raised garden bed in the fall. *Credit: Derek Thomas.*



## *Community Forums*

### **Well-Being and the Natural World**

**May 6, 2017**

Moderator: Ronda Chapman, Groundwork DC

Panel: Jay Coleman, Slick Fish; Anne O'Neil, National Park Service; Stella Tarney, Biophilic DC

The afternoon's discussion explored the physical and emotional impacts of our disconnection from the natural world, the role of nature as a healing source, and the various ways in which we can utilize natural space. A central theme of the panel's discussion was biophilia, the theory that humans are hardwired with an innate tendency to seek out connections to nature and other forms of life. Such a belief is behind the movement encourages an exploration of how where we live is designed, and to what extent nature is a part of the planning process. What impact does the value of nature to residents' health have on the design of our cities? The possible impacts that living in a biophilic city can have on D.C.'s youth are something artist and educator Jay Coleman is familiar with. His work with students has allowed him to intimately understand that children have multiple learning channels and the natural world taps into all of their senses. The aim, he argued, should be to teach residents how to look for it. In a world full of technology, many need to be re-educated on how to *experience* the world.

The challenge of equity in the creation of a biophilic city was one challenge panelists agreed has to be acknowledged and addressed. How can cities be eco-rich and ensure all residents are able to take advantage of the resources available to them? Such a challenge was a major priority, as the National Park Service (NPS) approached its centennial in 2016. As part of a call to action, the organization highlighted the need to connect people to the parks in their communities. Park Rx, an initiative founded on the understanding that green space is part of the overall health of communities, advances the use of parks and public lands to improve health and wellness in communities across the country. The practice of physicians prescribing nature to their patients is an effort to combat non-communicable chronic diseases and create a generation of environmental stewards. It is also, notes National Anne O'Neil of the NPS National Capital Region, an example of her organization's understanding that parks need to face externally, meeting people where they are, and forming key community partnerships.

Other forms of outreach connected to such issues were also explored. Approaching the topic from an urban planning perspective, Biophilic,



DC's Stella Tarnay highlighted the importance of nature at all scales and the infusion of the natural world in all aspects of the daily experiences of city residents: from a small garden outside an individual's front door to encounters with nature on the walk to school and at other moments throughout the day. Groundwork, DC's Ronda Chapman pointed to the power of community gardens to reconnect residents to their cultural and agricultural heritage, while providing a space to acknowledge and address issues of food scarcity and the practice of healthy eating. Jay Coleman pointed to the power of pairing art and nature, which can allow for a sense of stewardship for community space.

Ultimately, the importance of acknowledging the roots of disconnection from the natural world, developing trust, and cultivating long-term partnerships were deemed essential for genuine, equitable, and sustainable community engagement with the natural resources cities have to offer.

### **Documenting Anacostia** **July 15, 2017**

Moderator: Phil Hutinet, East City Art  
Panel: Melissa Green, ArtReach; Noel Lopez, National Park Service; Becky Harlan, Bruce McNeil, Krista Schlyer, photographers

The focus of the morning's conversation was the various ways in which Anacostia has been documented. Central to the discussion was a definition of "Anacostia." Moderator Phil Hutinet pointed out that for most Washingtonians there is no disambiguation between the river and its communities. Anacostia has been a term used for everything east of the Anacostia River. National Park Service cultural anthropologist Noel Lopez points to the difficulty of addressing such a question. From a professional perspective, he stressed the necessity of connecting to the various communities and asking them to define the river, where they live themselves. Fine Arts photographer Bruce McNeil defined it as a historical river integral to the histories of the Native Americans who settled in the area and Captain John Smith. He also defined the river as a long-time divider of D.C. in a variety of ways. Photographer Krista Schlyer views the watershed as whole—the land, water, and how residents have interacted with them to create a place for themselves. The definitions of Anacostia have shifted over time and context.

Like its definition, the documentation of Anacostia has taken many forms. Bruce McNeil's images of Anacostia document life as it is lived along the river and convey a sense of nostalgia for those who have walked along the river through the centuries. Inspired by Anacostia Community Museum



research conducted on Mami Water, the female water spirit who serves as a protector of women, fine art photographer McNeil created his own version of the spirit, a young black woman who could serve as a "shero" for young women east of the river. In her work, photographer Becky Harlan sought to explore the environmental aspects of the city and the communities who gather around it. She documented the members of the Seafarers Yacht Club, the oldest African American Yacht Club on the East Coast (some say in the nation) points to the rich personal histories along the Anacostia while speaking to issues of exclusion, access to the river's resources, and efforts to restore it to health.

The importance of the sharing of such personal and historical narratives is reflected in the work of ArtReach led by Melissa Green. Using art to introduce young women not only to the river's environs but also the experiences of their elders allows for an intergenerational connections that serves to strengthen community bonds and allows students to understand the visual arts as a way to conveying the history of their communities. The documentation of cultural practices along/within Anacostia is also reflected in the work of Noel Lopez who has studied subsistence fishing long the Anacostia and the Potomac. His work has led him to broaden his definition of "subsistence" to include cultural survival, acknowledging that residents continue to fish in the watershed for cultural reasons, as a way to connect to their larger communities, historical and present, local and beyond.

In her documentation of the watershed, through her images, Krista Schlyer seeks to introduce residents to their smallest neighbors. Her portraits of salamanders, beetles, butterflies set against a simple white background point to the presence of the various creatures which make the watershed their home, reminding residents of their place and obligations within in the larger ecology of the Anacostia.

The panel also pointed to the other forms of community documentation- Instagram, twitter, snapchat- which allow residents to capture daily life along and in Anacostia from an insider's perspective. The power of such a variety of documentation is pertinent in a period of neighborhood change. As the "Anacostia" is restored, made more attractive to various external parties, documentation can be used by residents to tell the stories of where they have lived. It also allows for a deeper knowledge and understanding of the value of their various histories. Using the examples of other communities who have sought to and have protected their historic districts, Lopez stressed the kind of power that comes from the use of historic registries, the collection of resident experiences, and other forms of data as weapons against displacement.



## **The National Park Service and East of the River July 15, 2017**

Moderator: Vincent Vaise, National Capital Parks East  
Panel: Dennis Chestnut, Environmental Educator; Eola Dance, National Capital Region; Tara Morrison, National Capital Parks East

One of the aims of the forum was to explore the various ways in which the National Park Service can serve as a resource to communities east of the Anacostia River. A key issue raised was public perception of NPS as an organization and a general lack of knowledge regarding the breadth of its work. As Superintendent Tara Morrison stated, “The Park Service is more than working outside. NPS is like a body. We need all of these pieces to make the organization function.” In addition to the more recognizable historic sites, parks, monuments, and preserves, some of the “pieces” she was referring to include the Cultural Resource and Natural Resource Divisions which employ biologists, anthropologists, architects, historians, landscape architects, and I.T. specialists; various programs that oversee historic preservation and historic buildings; and the Pathways Program which allows students enrolled in high school, college, and trade school to take part in paid opportunities as they explore careers within the Park Service.

Dennis Chestnut, the former founding director of Groundwork, DC, community leader, and educator, highlighted the importance of making community residents, particularly youth, aware of the resources at their disposal. Through an official agreement with NPS, Groundwork students were given the opportunity to explore the various pathways available to them, as well as the process needed to move through the NPS system. Such exposure to the various branches of NPS provided students access to the larger world beyond their communities. Opportunities to explore the larger iconic parks allowed students to encounter a multitude of experiences, landscapes, and perspectives and also enabled them to make the connection between the larger iconic parks and monuments and the resources present in their own communities. This connection is key. Cultural anthropologist Eola Dance pointed to the disconnect between the identification of NPS with iconic sites and the reality that most parks are in an urban setting. Some employees, in fact, serve their entire careers in urban settings. Residents in urban communities often don’t associate the natural world around them to the Park Service. This disconnection highlights the organization’s focus on community outreach and engagement. How do we define “urban”? Is it concrete or population density? How have greenspaces and waterways determined where we live? How have we changed the landscape? How has the urban setting evolved over time?



Launched in 2015, NPS' Urban Agenda seeks to engage urban communities to aid in the recognition of their natural resources. Such efforts are most successful by understanding a communities' interests and what they value. Its three goals are to be relevant to all Americans, nurture a culture of collaboration, and activate 54 community-assistance programs. Chestnut sees local sites as gateways to the larger organizations and pointed to the power of community youth seeing themselves reflected in the various NPS roles before them.

Opportunities for youth to engage NPS take the form of the Urban Tree House in Anacostia Park, Ranger Walks, Jr. Rangers, career days at local schools, the Youth Conservation Corps, and Nature Fest, a week-long spring break program. NPS also provides programs for educators and online exhibitions.

**For more information:**

[www.thesca.org/urban-tree-house](http://www.thesca.org/urban-tree-house)

[www.nps.gov/subjects/youthprograms/index.htm](http://www.nps.gov/subjects/youthprograms/index.htm)

[www.nps.gov/subjects/teachingwithhistoricplaces/index.htm](http://www.nps.gov/subjects/teachingwithhistoricplaces/index.htm)

[www.nps.gov/subjects/urban/upload/urbanagenda\\_web.pdf](http://www.nps.gov/subjects/urban/upload/urbanagenda_web.pdf)



## *Contributors*

**Yvonne L. Chan** is the John Kay Teaching Chair in Research Science at 'Iolani School where she teaches independent research to grades 9–12. She is the director of the Sullivan Center Research Lab whose goals are to nurture student independent research, foster citizen science among schools and communities, and provide outreach and workshops to improve STEM-education in Hawai'i. Dr. Chan earned a bachelor of arts in biology from Pomona College, a master of science from the University of British Columbia's Center for Applied Conservation Biology, and a PhD from Stanford University's Department of Biological Sciences, where she used ancient DNA to understand small mammal response to past climate change.

**Derek Esibill** ran operations of oceanographic research vessels for 10 years before teaching science for the Hawai'i Department of Education where his students were engaged in research projects investigating correlations between age, bacterial infection, and age on coral tumors as well as water quality in the Hamakua and Kawainui marsh systems. He is now program director of the Watershed Investigations, Research, Education, and Design (WIRED) program, a project of the Pacific American Foundation (PAF). WIRED engages 6th–12th grade students in current, ongoing, leading-edge research investigating the impacts of land management practices on watersheds and the associated coral reefs. Mr. Esibill is also PAF's technology coordinator, network administrator, STEM coordinator, and Nature Activities for Learning and Understanding (NALU) Studies science and engineering teacher. He has a love for all things ocean.

**Kenneth Y. Kaneshiro** is a member of the research faculty in the Pacific Biosciences Research Center, School of Ocean and Earth Science and Technology at the University of Hawai'i at Mānoa. He has been involved with the Hawai'ian *Drosophila* Project since 1963 and has served as its project director since 1968. He established the Center for Conservation Research and Training at the University of Hawai'i in 1993 and has served as the program firector since its establishment. He has also served as founder and executive chair of the Hawai'i Conservation Alliance since 1993. Dr. Kaneshiro also serves on the board of directors of the Hawai'i Exemplary State Foundation, the Alliance for Resilience and Global Empowerment, and the Community Partnerships Center Foundation. Most recently, his systems-thinking approach in his research on the Hawai'ian *Drosophila* has led to the development of the emerging field of "sustainability science" based on an understanding of the fundamental interactions between nature and humans. Such an integrative human-natural systems approach is required to formulate strategic solutions in addressing the wide range of issues associated with ecosystems and their



relationships to human health and well-being.

**Megan Kawatachi** was born and raised on O’ahu and lived on the East Coast of the continental United States—between New Jersey, New York, and Rhode Island—attending school and teaching, before returning home to Hawai’i. Megan earned a BA from Brown University and both an MA and MEd from Columbia University Teachers College. She is currently pursuing her PhD in educational leadership from Lesley University, Graduate School of Education, and is privileged to be the director of Sullivan Center Innovation and Leadership at ‘Iolani School.

**Katrina D. Lashley** is program coordinator of Urban Waterways at the Anacostia Community Museum. She received her BA in English literature and Italian at Rutgers University and earned an MA in history (public history track) at American University with a focus on the British Caribbean. Ms. Lashley has worked on projects for the National Museum of American History and Arlington House. In addition to her public history work, she taught English literature and language for 12 years.

**Mr. Herb Lee Jr.** serves as executive director at the Pacific American Foundation (PAF). Under Mr. Lee’s leadership, PAF has been recognized as one of the leading non-profits in the development of culture-based education programs for both Native Hawai’ians and non-Hawai’ian students in Hawai’i’s public schools. He has been a member of advisory board of AKAMAI Capital LLC since September 2012. He has received wide recognition within Hawai’i for his involvement with organizations that protect and preserve environment resources, culture, and the arts, as well as for his leadership of multiple and highly successful education and culture-based curriculum projects, such as the award-winning “K hea Loko and Aloha ‘ina” projects. His programs have trained over 2,500 teachers and benefited over 50,000 students (grades K through 12) across the state in both rural and urban settings.

**Hyon K. Rah** specializes in working with communities to prepare and implement infrastructure-based resilience strategies, based on her interdisciplinary experience in architecture, urban planning, clean energy, and water management. She has worked and traveled in over 30 countries, building consensus and facilitating project planning and implementation in five languages—English, Korean, Japanese, German, and Spanish. A Leadership in Energy and Environmental Design Accredited Professional (LEED AP), Envision Sustainability Professional (ENV SP), and Green Globe Accredited Auditor, Ms. Rah received her Master of Architecture from the University of Michigan, Ann Arbor, and a Master of Science in water management and hydroinformatics through the European Commission’s EuroAquae Programme, a consortium of five EU-based universities. She is principal of RAH Solutions in Washington, D.C., a consultancy focused



on providing community-based integrated water and energy solutions for sustainable development.

**Brenda Lee Richardson**, a resident of Ward 8 in Washington, D.C., and an eco-feminist, has been working on welfare reform, environmental justice, economic development, and health issues for the past 25 years. She currently serves as interim managing director of the Earth Conservation Corps. Previously Ms. Richardson was the deputy chief of staff for Councilmember Marion Barry, director of resident services for the D.C. Housing Authority, and executive director of the Anacostia/Congress Heights Partnership. For many years, she served as managing director of the Metropolitan Dialogue, a faith group that met monthly to discuss civic issues in the District of Columbia. She is a board member of Blue Alley's Orchestra and serves on MedStar Georgetown University Hospital's Lombardi Cancer Center Community Advisory Group. She has served as a board member for A Greater Washington, Anacostia Watershed Society, Congress Heights Main Streets, the D.C. Public Library, and DC Water. Ms. Richardson has a BA in political science from the University of Michigan and a Master's of Social Work from the University of Maryland, Baltimore.

**Derek Thomas** has been nationally recognized for his garden design work. He is committed to the urban waterways movement by teaching and lecturing on the importance of protecting and preserving the waterways of Washington, D.C., and beyond. He plants a garden every year. He is founder and president of Thomas Landscapes LLC in Washington, D.C. His garden segments can be seen on his company's YouTube channel. He can be contacted at [www.thomaslandscapes.com](http://www.thomaslandscapes.com) and @ThomasGardenGuy on Twitter.

**Waterfront Development Corporation** was established in 1986. It plans, coordinates, and implements strategies to revitalize Louisville's Waterfront. WDC was created by an interlocal agreement between Jefferson County, the City of Louisville (now Louisville Metro), and the Commonwealth of Kentucky to oversee redevelopment of Louisville's waterfront from a blighted and underutilized area into a vibrant, active area. The result is Waterfront Park, which has improved the quality of life of Louisville residents and has also been a catalyst for business and residential redevelopment in the Waterfront District and connecting areas of downtown Louisville.